SOUTH CAROLINA ELECTRIC & GAS COMPANY

Cayce, South Carolina

Transmission Line Siting and Environmental Report

for the

Graniteville-South Augusta 230 kV Tie Line

and Urquhart-Graniteville #2 230 kV Line

and

Associated Facilities

Aiken County, South Carolina

April 2017

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1.1 Introduction and Project Overview

South Carolina Electric & Gas Company ("SCE&G" or "Company") has prepared this report pursuant to The South Carolina Utility Facility Siting and Environmental Protection Act, S.C. Code Ann. § 58-33-10 et seq. (2015). SCE&G, a wholly-owned subsidiary of SCANA Corporation, supplies electrical energy to approximately 709,000 customers throughout its 17,000-square mile electric service area that includes all or portions of 24 counties in central and southern South Carolina.

Described in this report are two 230 kilovolt ("kV") transmission lines (one new line and one replacement line) SCE&G proposes to build in Aiken County, South Carolina. The new 230 kV line, which will be a single-circuit 230 kV tie line connecting the SCE&G and Southern Company electrical transmission systems, will originate at the Southern Company's South Augusta Substation and run to SCE&G's existing Graniteville No. 1 Substation. This line will be owned and operated by Southern Company from its point of origin to the first transmission line structure on the South Carolina side of the Savannah River, which will be on the Urquhart Generating Station site. From this structure to the Graniteville Substation, a distance of approximately 18.1 miles, the line will be owned and operated by SCE&G and will be called the Graniteville-South Augusta 230 kV Tie Line.

The second 230 kV line will originate at SCE&G's existing Urquhart 230 kV Substation adjacent to the Urquhart Generating Station and run to SCE&G's existing Graniteville No. 2 Substation, a distance of approximately 17.6 miles. This line will be named Urquhart-Graniteville #2 230 kV Line and will replace SCE&G's existing Urquhart-Graniteville #2 230 kV Line, which will become a portion of the Graniteville-South Augusta 115 kV Tie Line[1], as explained more fully in Sections 1.3 and 1.4 of this report.

Associated facilities that will be added to SCE&G's transmission system in conjunction with the Graniteville-South Augusta 230 kV Tie Line and Urquhart-Graniteville #2 230 kV Line will be one

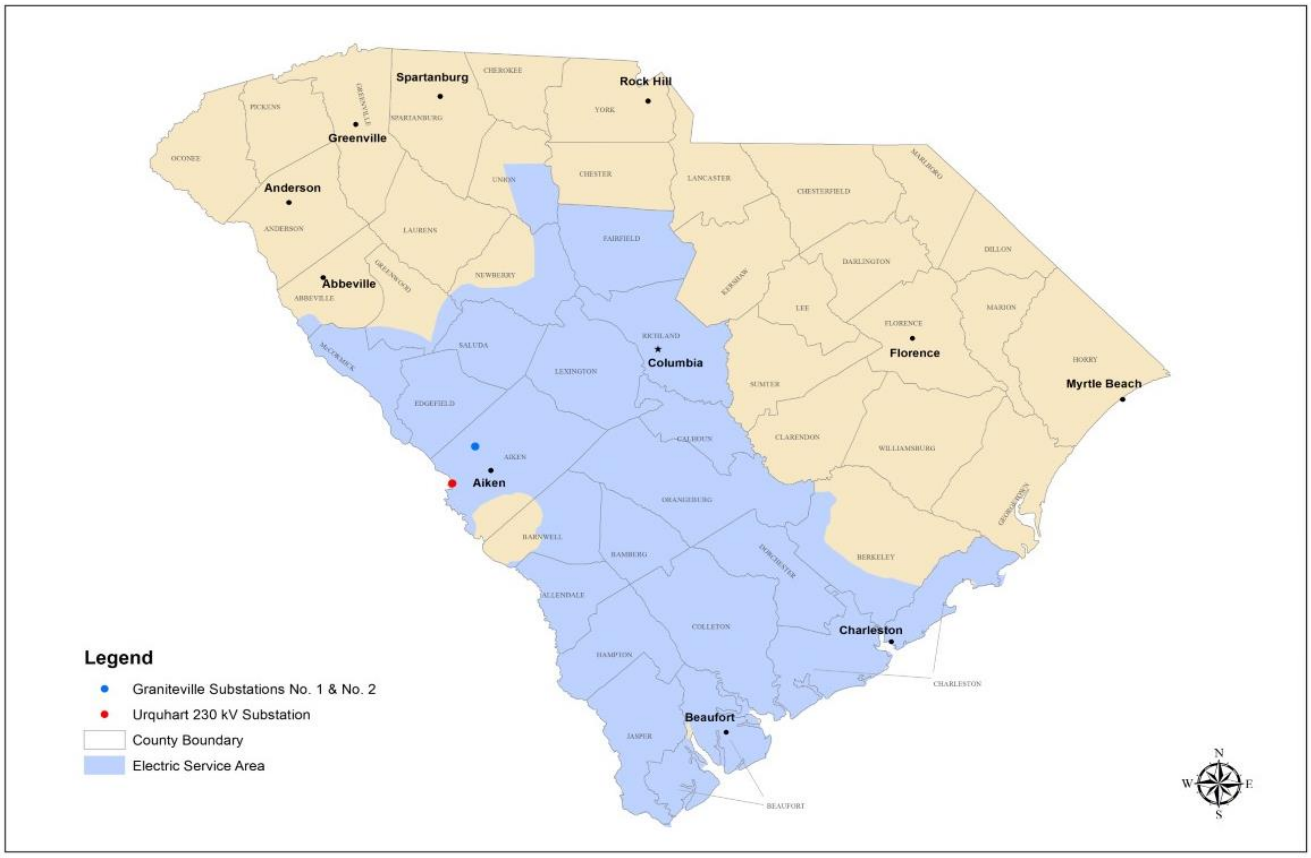
[1] Although below the 125 kV voltage threshold requiring filing an application for a Certificate of Environmental Compatibility and Public Convenience and Necessity from the South Carolina Public Service Commission pursuant to the South Carolina Utility Facility Siting and Environmental Protection Act, S.C. Code Ann. § 58-33-10 et seq. (2015), the Graniteville-South Augusta 115 kV Tie Line is described in certain sections of this report because it is integral to the agreement reached by SCE&G and Southern Company that calls for the addition of one new interconnecting 230 kV line and one new interconnecting 115 kV tie line. Also, the addition of the Graniteville-South Augusta 115 kV Tie Line is a contributing factor in SCE&G's decision to replace the existing Urquhart-Graniteville #2 230 kV Line with the proposed Urquhart-Graniteville #2 230 kV Line.

230 kV Line terminal and one 230 kV power circuit breaker at Graniteville Substation No. 1 to accommodate the Graniteville-South Augusta 230 kV Tie Line.

Throughout this report, the new and replacement 230 kV lines will be referred to individually as the **Graniteville-South Augusta 230 kV Tie Line** and **Urquhart-Graniteville #2 230 kV Line** and, collectively, as the **Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line, Graniteville-South Augusta / Urquhart-Graniteville #2 Lines** or **Lines**.

Figure 1.1-1 shows SCE&G's electrical service area and the locations of the Urquhart 230 kV Substation and Graniteville Substations No. 1 and No. 2.

Figure 1.1-1: SCE&G Electric Service Area



The addition of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines and associated facilities to SCE&G's electrical transmission system is critical to the operational integrity of the system and necessary to ensure that SCE&G remains in compliance with North American Electric Reliability Corporation ("NERC") Transmission Planning Standards and the Company's own Long Range Planning Criteria. Failure to add the Lines and associated facilities could result in excessive electrical loading on a critical Southern Company-SCE&G interconnecting 230 kV Line

(Vogtle-Savannah River Site 230 kV Tie Line) under certain contingency conditions starting as early as 2019, as explained in Section 1.3 of this report. The addition of the Graniteville-South Augusta 230 and 115 kV Tie Lines and associated facilities will establish additional electrical paths between SCE&G and Southern Company electrical transmission systems and thus will distribute the flow of power more reliably and evenly into the SCE&G system while preventing overloading on the Vogtle-Savannah River Site 230 kV Tie Line. Also, replacing the existing Urquhart-Graniteville #2 230 kV Line, which will allow it to serve as a portion of the Graniteville-South Augusta 115 kV Tie Line, with the proposed Urquhart-Graniteville #2 230 kV Line will maintain the level of 230 kV service, operating flexibility, and reliability level required by the two 230 kV generators at the Urquhart Generating Station.

1.2 Process Used by SCE&G to Determine the Need for New and Upgraded Electrical Transmission Facilities

SCE&G uses external and internal criteria to guide decision-making related to the development of new or upgraded electric transmission facilities. Externally, SCE&G subscribes to the Transmission Planning Standards established by the NERC and, internally, SCE&G adheres to its Long Range Planning Criteria. In accordance with these standards and criteria, SCE&G's transmission system is designed so that nothing more serious than local load impacts will occur during certain contingencies. Also, SCE&G's transmission system is designed so that after appropriate switching and re-dispatching following contingencies, all non-radial electrical loads can again be served with reasonable voltages, and all facilities can again operate within acceptable operating limits. Examples of contingencies considered include the following:

1. Loss of any generator;
2. Loss of any transmission circuit operating at a voltage level of 115 kV or above;
3. Loss of any transmission transformer;
4. Loss of any electrical bus and associated facilities operating at a voltage level of 115 kV or above;
5. Loss of all 115 kV or above circuits on a common structure;
6. Loss of entire generating capacity in any one generating plant;
7. Loss of any generating unit simultaneously with the loss of a single transmission line;
8. Loss of all components associated with a transmission circuit breaker failure; and,

9. Loss of any generator, transmission circuit, or transmission transformer, followed by manual system adjustments, followed by the loss of another generator, transmission circuit, or transmission transformer.

SCE&G conducts system analyses on a continuing basis to test its transmission system for compliance with NERC standards and its Long Range Planning Criteria. Whenever the system analyses (i.e., power flow studies) indicate that a single contingency occurrence (usually categorized as an N-1 contingency) or the simultaneous occurrence of multiple contingencies (usually categorized as an N-2 contingency) will result in interruption of service more severe than local electrical load impacts that cannot be mitigated and managed by appropriate switching and re-dispatching to restore all non-radial loads and the operation of all facilities within acceptable operating limits, system modifications must be completed to prevent the specific contingency or contingencies and/or the adverse results thereof.

1.3 Determination of Project Need and the Proposed Action

Transmission Planning studies indicate that the occurrence of certain contingencies will result in heavy electrical loading on a critical Southern Company-SCE&G interconnecting 230 kV Line (Vogtle-Savannah River Site 230 kV Tie Line) as early as 2019. To prevent future excessive loading conditions on this line and to distribute the flow of power more reliably and evenly into the SCE&G system, additional electrical transmission paths are necessary between Southern Company and SCE&G. After studying multiple options with Southern Company and others to decrease the power flow on the Vogtle-Savannah River Site 230 kV Tie Line, SCE&G and Southern Company have agreed to establish the following two new Southern Company / SCE&G interconnecting tie lines that will cross the Savannah River and enter South Carolina onto SCE&G's Urquhart Generating Station site:

1. The Graniteville-South Augusta 230 kV Tie Line
2. The Graniteville-South Augusta 115 kV Tie Line

In addition to decreasing the power flow on the existing Vogtle-Savannah River Site 230 kV Tie Line and more reliably and evenly distributing the flow of power into the SCE&G system, the new Southern Company / SCE&G 230 and 115 kV interconnecting tie lines will increase the transfer capacity for all utilities interconnected to SCE&G's electrical transmission system.

The existing Urquhart-Graniteville #2 230 kV Line is one of two transmission lines that service the Urquhart Generating Station's two 230 kV generators totaling 330 MW. Relocating the Urquhart-Graniteville #2 230 kV Line onto double-circuit 230 kV structures alongside the

Graniteville-South Augusta 230 kV Tie Line as explained in Section 1.4 will maintain the current operating flexibility and level of reliability required for the Urquhart generators.

Construction of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines and associated facilities include the following actions:

1. Construction of an approximate 0.92 mile segment of the Graniteville-South Augusta 230 Tie Line on the Urquhart Generating Station site by utilizing existing and new SCE&G right-of-way.[2]
2. Removal of one existing 115 kV line constructed on wooden H-Frame structures that runs between the Urquhart Generating Station and Graniteville Substation No. 1 (Urquhart-Graniteville 115 kV Line).
3. Constructing the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines in the existing right-of-way space vacated by removal of the Urquhart-Graniteville 115 kV Line. The Lines will be constructed on single-pole, double-circuit steel structures and double-pole angle structures. Both Lines will utilize bundled 1272 ACSR (aluminum conductor, steel reinforced) conductor.
4. The addition of one 230 kV line terminal and one 230 kV power circuit breaker at Graniteville Substation No. 1.

1.4 Project Location

Beginning at Southern Company's South Augusta Substation on Dan Bowles Road in Augusta, Georgia, the Graniteville-South Augusta 230 kV Tie Line (and the Graniteville-South Augusta 115 kV Tie Line, as well) will run for approximately 5.2 miles in an existing Southern Company transmission line right-of-way to a double-circuit 230 kV structure on the South Carolina side of, and adjacent to, the Savannah River. Ownership of both lines will convert from Southern Company to SCE&G at that structure, which will be on the Urquhart Generating Station site[3]. From that structure, the new 230 and 115 kV tie lines will run together on 230/115 kV double-circuit, steel pole structures for approximately 0.92 miles within existing and new right-of-way on the Urquhart Generating Station site. For approximately one-half of this total distance, the new tie lines will run in

[2] The Graniteville-South Augusta 230 and 115 kV Tie Lines will run together on 230/115 kV double-circuit structures over the approximately 0.92 mile segment on the Urquhart Generating Station site.

[3] SCE&G's Urquhart Generating Station is the subject of a FILOT lease between Aiken County and SCE&G in which Aiken County holds title to the underlying fee property. Under said FILOT lease SCE&G has or can without difficulty obtain any necessary rights to install transmission lines, including the proposed Graniteville-South Augusta 115 and 230 kV Tie Lines. Moreover, as of the date of this report, SCE&G and Aiken County have begun the process whereby ownership of the Urquhart Generating Station site will revert back to SCE&G.

an existing right-of-way and/or alongside an existing SCE&G 115 kV line that is built within a 100 feet wide right-of-way. Where running alongside the existing 115 kV line, the existing right-of-way width will be increased to 150 feet to accommodate the new tie lines. Where not on existing right-of-way or adjacent to the existing 115 kV line over the remaining distance on the Urquhart Generating Station site, approximately 0.46 miles, SCE&G will dedicate a new 100 feet wide right-of-way for the new 230/115 kV tie lines.

The approximately 0.92 mile right-of-way corridor on the Urquhart Generating Station site will intersect an existing SCE&G transmission line right-of-way corridor approximately 2,000 feet east of SCE&G's Urquhart 230 kV Substation. At the corridor intersection point, which is on the Urquhart Generating Station site, the Graniteville-South Augusta 230 kV Tie Line will join the Urquhart-Graniteville #2 230 kV Line that originates at Urquhart 230 kV Substation, and the Lines will run together within existing SCE&G right-of-way on new, double-circuit 230 kV steel poles for approximately 17.2 miles to their respective termination points at Graniteville Substations No. 1 and No. 2. At the aforementioned corridor intersection point, the Graniteville-South Augusta 115 kV Tie Line will be connected to the conductor presently serving the existing Urquhart-Graniteville #2 230 kV Line, which will be disconnected from the 230 kV bus at the Urquhart and Graniteville #2 Substations and reconnected to the 115 kV bus at Graniteville Substation. Thus the existing Urquhart-Graniteville #2 230 kV Line will be operated at 115 kV and will become a portion of the Graniteville-South Augusta 115 kV Tie Line. The proposed Urquhart-Graniteville #2 230 kV Line will serve as the replacement line for the existing 230 kV line that will become a portion of the Graniteville-South Augusta 115 kV Tie Line. To provide space to construct the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines in the existing right-of-way, the existing Urquhart-Graniteville 115 kV line on wooden H-frame structures will be removed.

Figure 1.4-1 shows the existing and proposed new right-of-way on the Urquhart Generating Station site within which the Graniteville-South Augusta 230 and 115 kV Tie Lines will be built. Figure 1.4-2 shows the existing right-of-way corridor between the Urquhart 230 kV Substation and Graniteville Substations No. 1 and No. 2 within which the Lines will be built.

Figure 1.4-1: Location of the New Right-of-Way Corridor on the Urquhart Generating Station Site

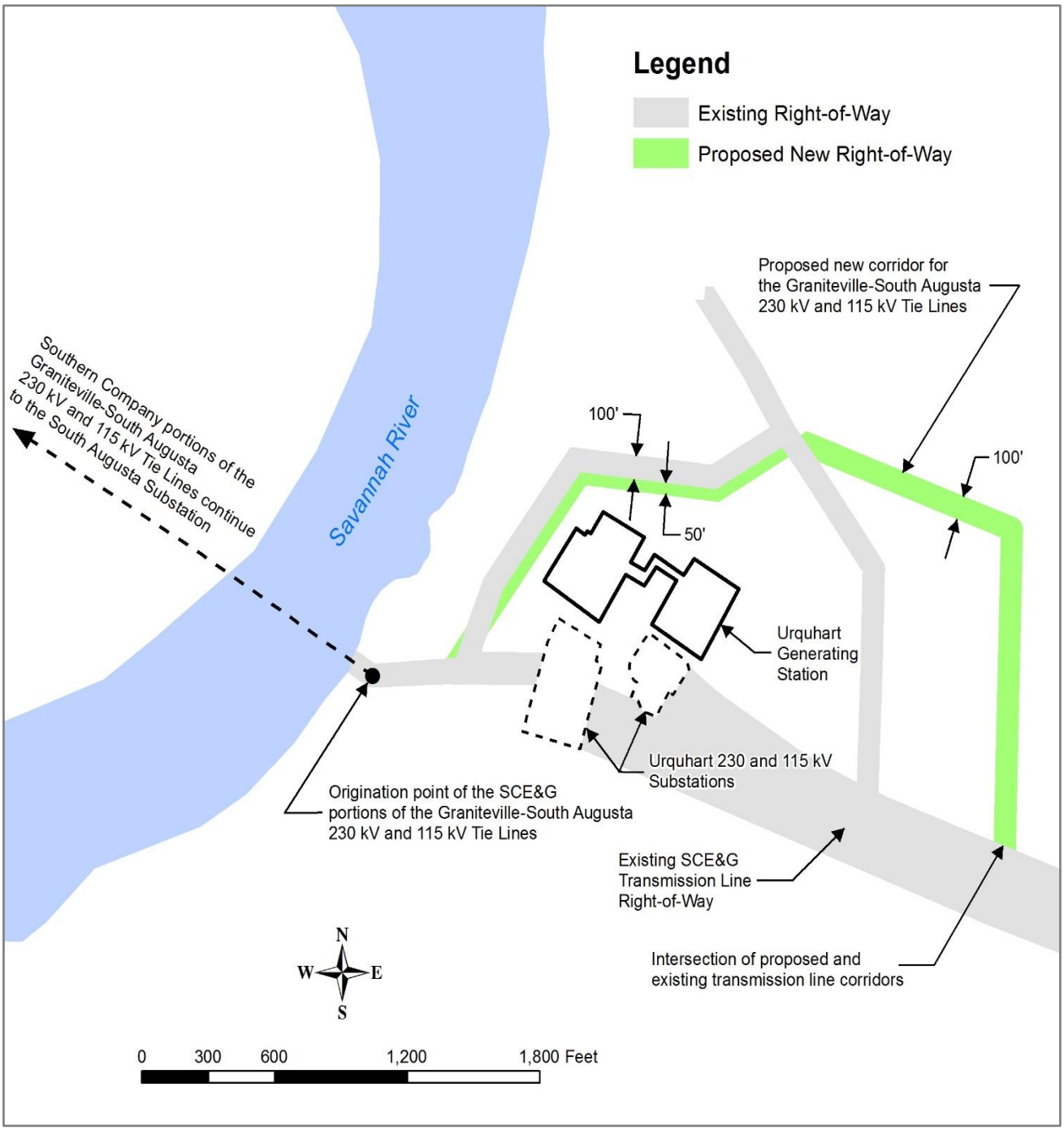
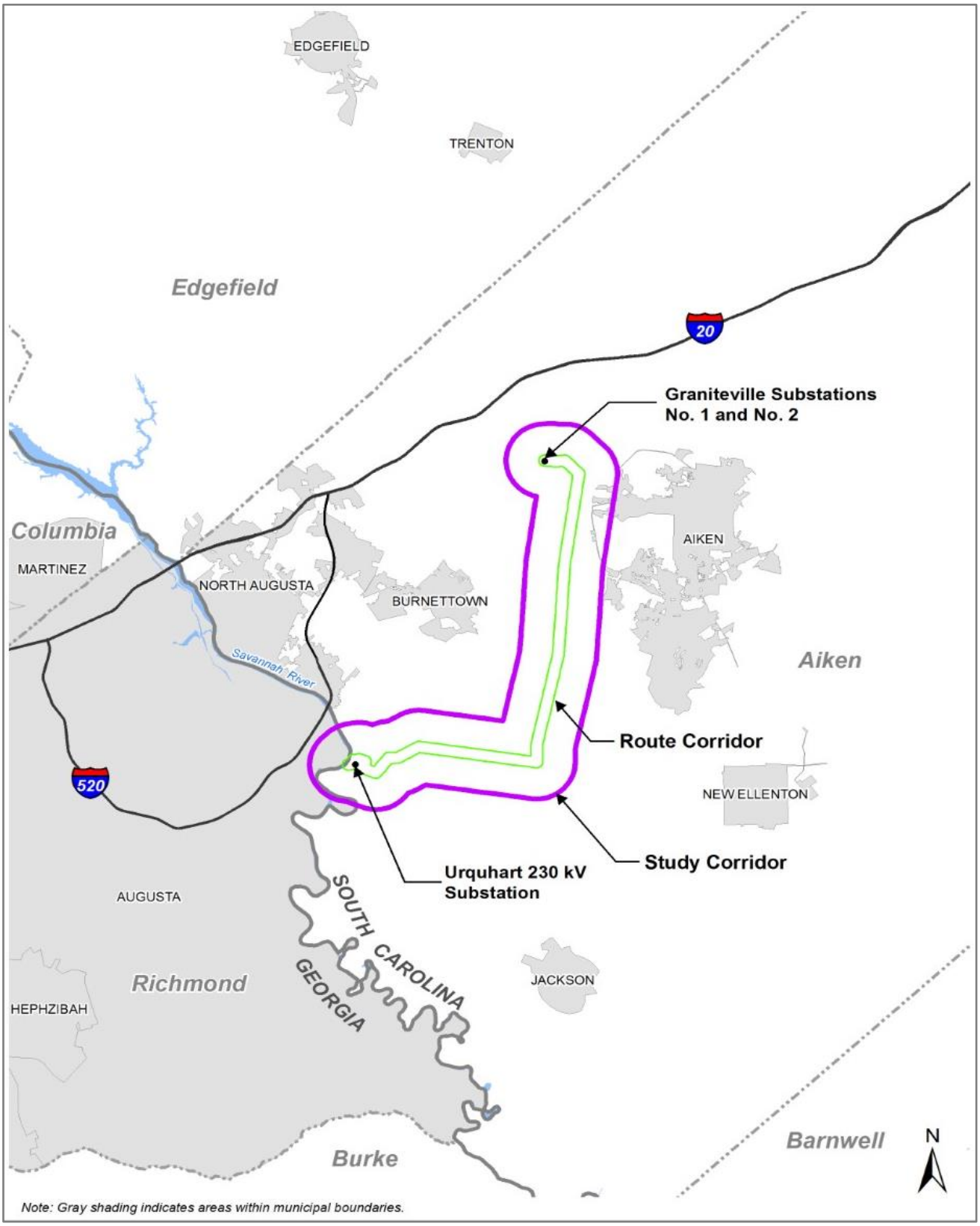


Figure 1.4-2: Overall Project Location



Note: The "route corridor" shown in the figure represents a 2,000' wide linear corridor (1,000' on each side of the proposed Lines) within which various data presented in this report were collected. The "study corridor" represents a 2.5 miles-wide linear corridor (1.25 mile-wide on each side of the proposed Lines) within which certain cultural resource data were collected.

1.5 Project Schedule

The Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line are scheduled to be in service by May 31, 2019.

1.6 Project Cost

The total project cost for the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line and associated facilities is estimated to be $28,000,000.

2.0 Transmission Line Route Selection

2.1 Utilization of Existing SCE&G Right-Of-Way

SCE&G determined that the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line can be built entirely within existing SCE&G right-of-way that runs between the Urquhart 230 kV Substation and Graniteville Substations No. 1 and No. 2 and within a combination of new and existing right-of-way, approximately 0.92 miles in length, on SCE&G's Urquhart Generating Station site (*Figure 1.4-1*). Other SCE&G transmission lines reside in various segments of the existing right-of-way corridors on the Urquhart Generating Station site and between the Urquhart 230 kV Substation and Graniteville Substations No. 1 and No. 2, including as many as two existing 230 kV lines and four 115 kV lines in the route segment nearest to the Urquhart 230 kV Substation (Figures 3.1-4 through 3.1-10 show the configuration of the proposed Lines in relation to existing SCE&G transmission lines in each of seven right-of-way segments the Lines will be built within). One of the existing 115 kV lines that runs between the Urquhart and Graniteville Substations, the Urquhart-Graniteville 115 kV Line, will be removed, and its vacated space in the existing right-of-way corridor will be occupied by the South Augusta / Urquhart-Graniteville #2 Lines. After the Lines are constructed and placed in service, the existing Urquhart-Graniteville #2 230 kV Line, which resides in the right-of-way corridor between Urquhart 230 kV and Graniteville No. 2 Substations, will be operated as the Graniteville-South Augusta 115 kV Tie Line, as explained in Section 1.3 of this report.

The utilization of existing right-of-way for new transmission lines provides many significant benefits when compared to new "greenfield" line routes including, but not limited to, the following:

1. Avoids additional utility easement severances of private property parcels;
2. Increases the utilization of existing SCE&G transmission line right-of-way assets;
3. Consolidates multiple transmission lines into a single corridor;
4. Significantly minimizes potential for environmental, land use, cultural resource and scenic impacts;
5. Eliminates cost associated with acquisition of new right-of-way;
6. Minimizes long-term right-of-way maintenance costs;
7. Increases service reliability by significantly reducing or eliminating the potential for line damage due to trees falling into the right-of-way from adjacent forested areas on at least one side of the proposed line or lines;

8. Significantly reduces right-of-way preparation cost (to the point of virtual elimination in many cases); and,

9. Minimizes construction schedule durations.

Except for approximately 7.26 acres of new right-of-way on the Urquhart Generating Station site that is needed to combine with and augment existing right-of-way on the site, existing SCE&G transmission line right-of-way sufficient to accommodate the future Graniteville-South Augusta / Urquhart-Graniteville #2 Lines is available. Because of that availability, SCE&G did not consider alternate routes for the construction of the proposed Lines. Any alternate "greenfield" route that would require the acquisition of new right-of-way would increase project cost, increase project duration, pose greater potential for adverse environmental effects, significantly increase land use impacts, and increase the potential for adverse effects to cultural and scenic resources in the area. For these reasons, SCE&G concluded it would not be justifiable to conduct a line route siting study and select a new "greenfield" route for the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines rather than utilizing its existing right-of-way. Rather, SCE&G investigated the existing right-of-way and new right-of-way segment on the Urquhart Generating Station site, including expansive areas surrounding them, to identify and quantify any likely direct and indirect effects to resources of South Carolina (environmental resources, land use, cultural resources and scenic resources) that could potentially result from construction of the Lines. Included in Chapter 5 of this report is a complete summary of the findings of various investigations and studies SCE&G conducted along the existing right-of-way and proposed new right-of-way segment within which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be located.

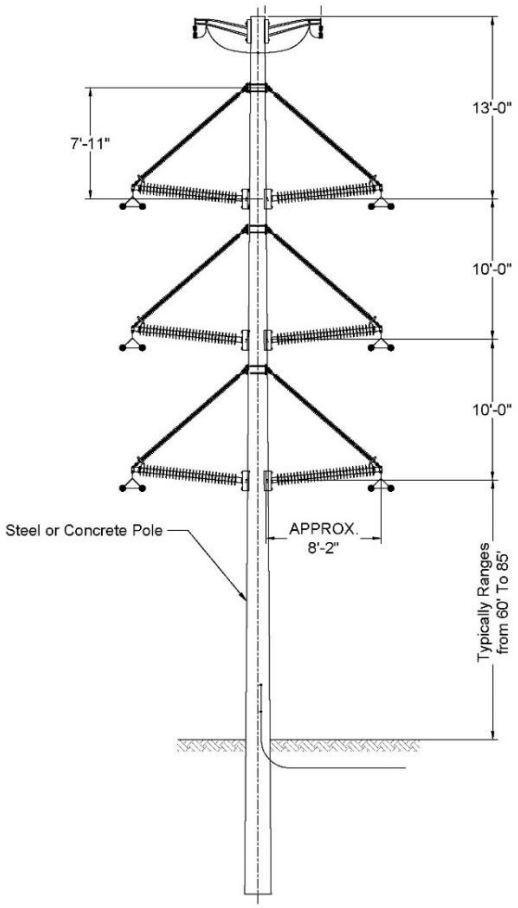
3.0 Description of the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line

3.1 Transmission Lines Description

The Lines will utilize SCE&G's standard double-circuit 230 kV line tangent and angle structures. The tangent structures consist of single shaft, tubular steel poles[4] with 230 kV braced-post insulators (back to back insulator configuration on double-circuit structures). These structures provide construction efficiency and reliability. They have a clean, simple profile that provides aesthetic benefits; the compact design of the braced-post insulator assemblies allows efficient use of right-of-way space; and they are proven to be economical over their serviceable life when compared with other possible structure types. The Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will utilize bundled 1272 ACSR conductor.

Figure 3.1-1 illustrates SCE&G's standard double-circuit 230 kV tangent structure.

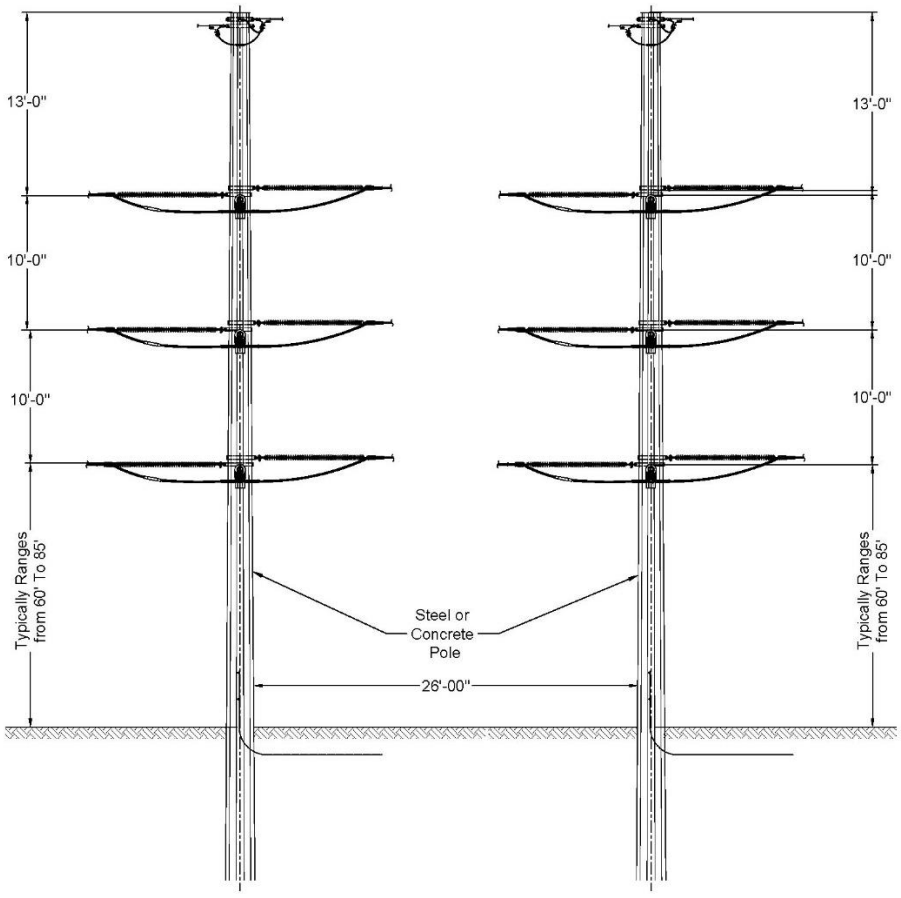
Figure 3.1-1 Standard SCE&G Double-Circuit 230 kV Tangent Structure Configuration
(not to scale)



[4] Although tubular steel poles will likely be used for tangent and angle structures on the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines, similarly sized cylindrical concrete poles are occasionally used by SCE&G.

Angle structures will be SCE&G's standard two-pole, dead-end angle structures or two-pole, swinging angle structures. Each type consists of two single shaft, tubular steel poles, and each pole supports one circuit at the line angle point. Figure 3.1-2 illustrates SCE&G's standard dead-end angle structure, which has a profile similar to SCE&G's standard swinging angle structure (differing, primarily, in the configuration of insulators).

Figure 3.1-2 Standard SCE&G Double-Circuit Dead-End Angle Structure Configuration
(not to scale)



The height of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' tangent and angle structures will typically range from approximately 95 feet to approximately 120 feet; however, exceptions to the typical height range may be necessary where crossing existing utility lines, roads, water bodies and/or where the Lines will connect to the substation terminals. Structure spacing will typically range from 400 feet to 1,000 feet.

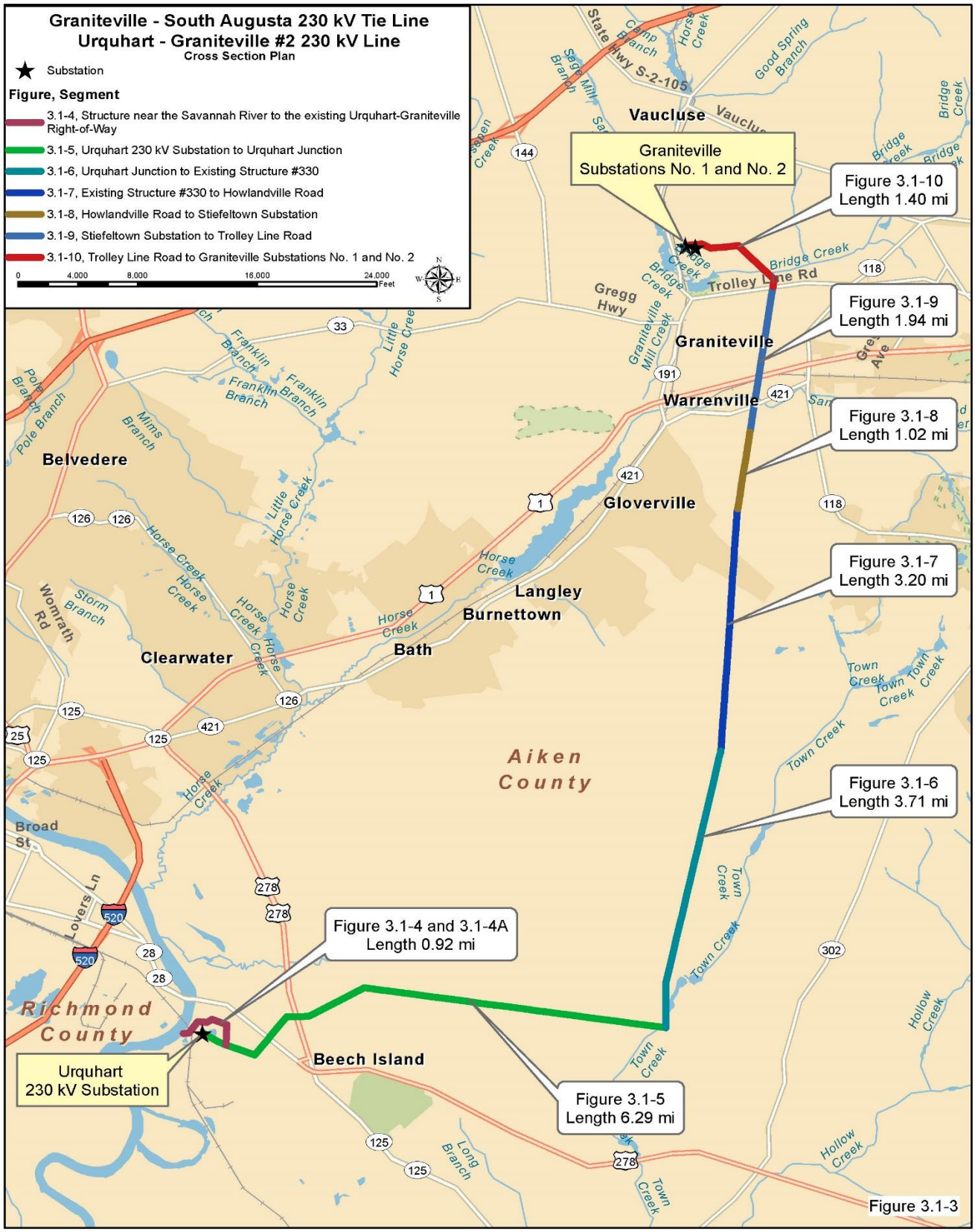
The route for the SCE&G segment of the Graniteville-South Augusta 230 kV Tie Line originates at the first transmission line structure on the South Carolina side of the Savannah River.[5] From that point, the line route will run for approximately 0.92 miles within a combination of new and existing right-of-way on SCE&G's Urquhart Generating Station site. This route segment will intersect an existing SCE&G transmission line right-of-way corridor and the Urquhart-Graniteville #2 230 kV Line approximately 2,000 feet east of SCE&G's Urquhart 230 kV Substation. From the intersection point, the Lines' route runs in north easterly / easterly directions for approximately 5.9 miles, where it turns and runs in a northerly direction on the west side of Aiken, South Carolina, for approximately 9.9 miles to an angle point. The Lines turn at that angle point and run in north westerly / westerly directions for approximately 1.4 miles to Graniteville Substations No. 1 and No. 2 (*Figures 3.1-A and 3.1-B*).

Figure 3.1-3 shows the new approximately 0.92 mile route segment on the Urquhart Generating Station site and six segments of the existing right-of-way between the Urquhart and Graniteville Substations within which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built. The figure references the appropriate cross-sectional view for each of the segments, which are illustrated in Figures 3.1-4 through 3.1-10. The cross-sectional views display the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line position within each of the right-of-way segments with regard to right-of-way edges and other existing transmission lines. All cross-sections represent views toward Graniteville Substations No. 1 and No. 2. Dimensions shown in the cross-sections are for illustration purposes and may vary slightly when final line engineering is completed.

[5] The segment of the Graniteville-South Augusta 230 kV Tie Line from Southern Company's South Augusta Substation to the first structure on the South Carolina side of the Savannah River (approximately 5.2 miles) will be constructed, owned and operated by Southern Company.

Figure 3.1-3 Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line Route Segments

(all segment lengths shown are approximate)



Note: For illustration purposes, standard SCE&G 230 kV tangent line structures are shown to represent the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line in the following cross-section views (Figures 3.1-4 through 3.1-10). As explained earlier in this section, angle structures will be SCE&G's standard two-pole, dead-end structures or two-pole, swinging angle structures as shown in Figure 3.1-2.

Figure 3.1-4 Structure near Savannah River to the Existing Urquhart-Graniteville Right-of-Way Where Not Adjacent to Existing Transmission Lines

(This line segment will reside entirely on the Urquhart Generating Station site)

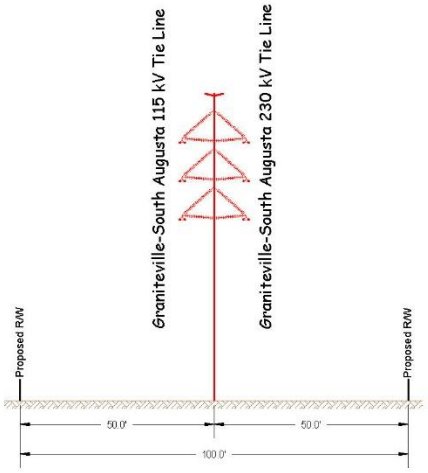


FIGURE 3.1-4
Structure near Savannah River to the Existing
Urquhart-Graniteville Right-of-Way Where Not Adjacent to
Existing Transmission Lines

Figure 3.1-4A Structure near Savannah River to the Existing Urquhart-Graniteville Right-of-Way Where Adjacent to Existing Transmission Lines

(This line segment will reside entirely on the Urquhart Generating Station site)

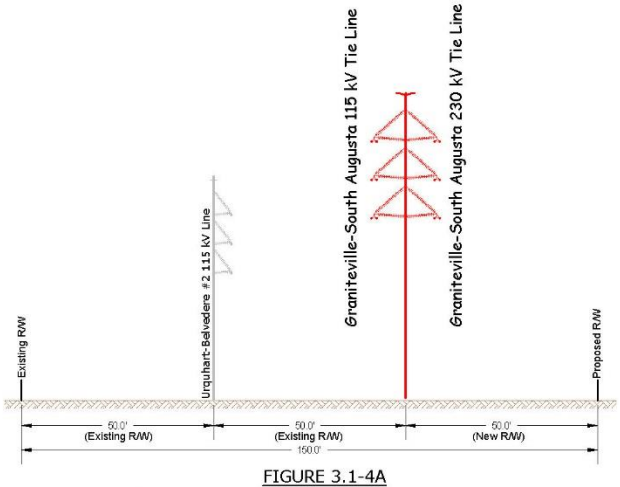


FIGURE 3.1-4A
Structure near Savannah River to the Existing
Urquhart-Graniteville Right-of-Way Where Adjacent to Existing
Transmission Lines

Figure 3.1-5 Urquhart 230 kV Substation to Urquhart Junction

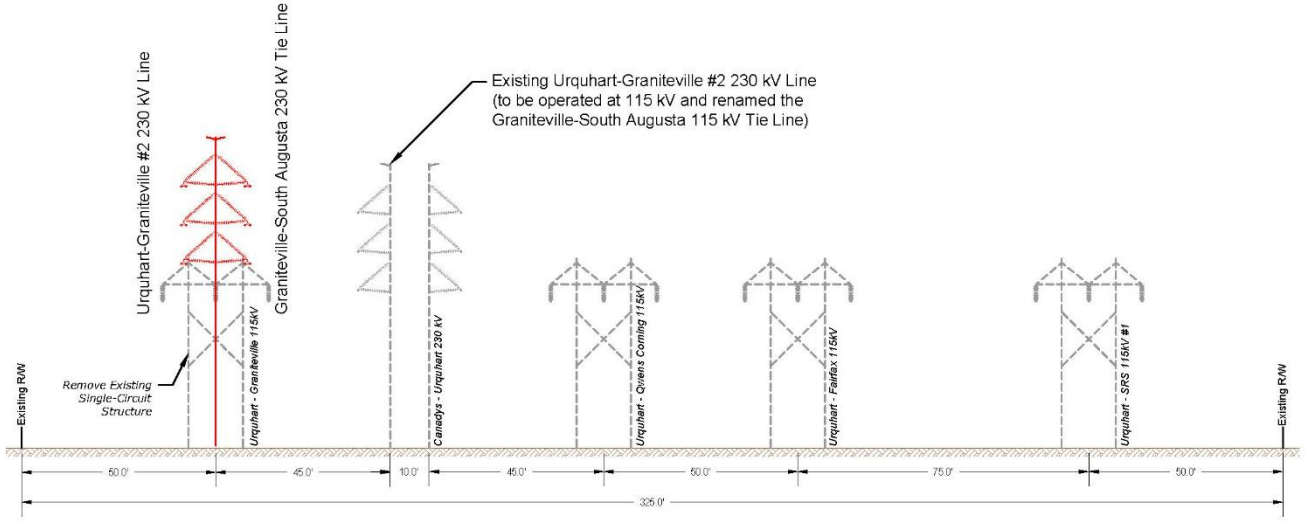


FIGURE 3.1-5
URQUHART 230 KV SUBSTATION to URQUHART JUNCTION

Note: The Graniteville-South Augusta 230 kV and 115 kV Tie Lines will enter this cross-section view at the intersection of the new and existing rights-of-way, which is approximately 2,000 feet east of the Urquhart 230 kV Substation.

Figure 3.1-6 Urquhart Junction to Existing Structure No. 330

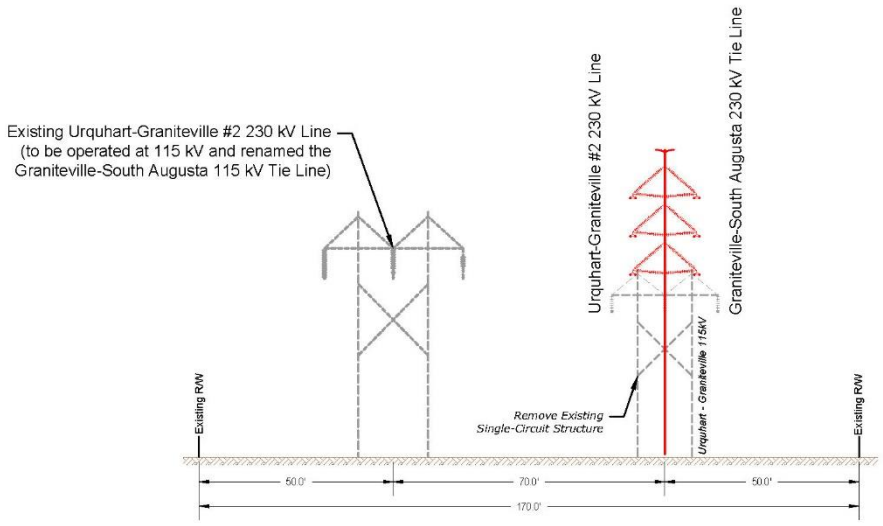


FIGURE 3.1-6
URQUHART JUNCTION to EXISTING STRUCTURE #330

Figure 3.1-7 Existing Structure No. 330 to Howlandville Road

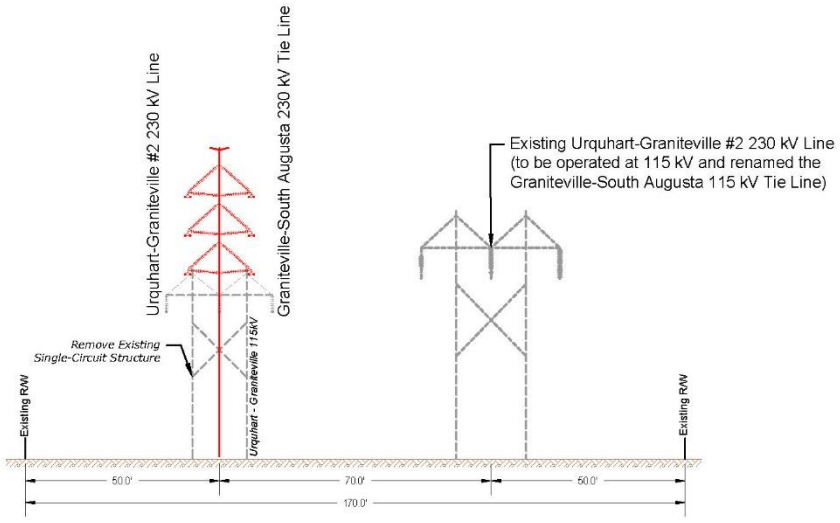


FIGURE 3.1-7
EXISTING STRUCTURE #330 to HOWLANDVILLE ROAD

Figure 3.1-8 Howlandville Road to Stiefeltown Substation

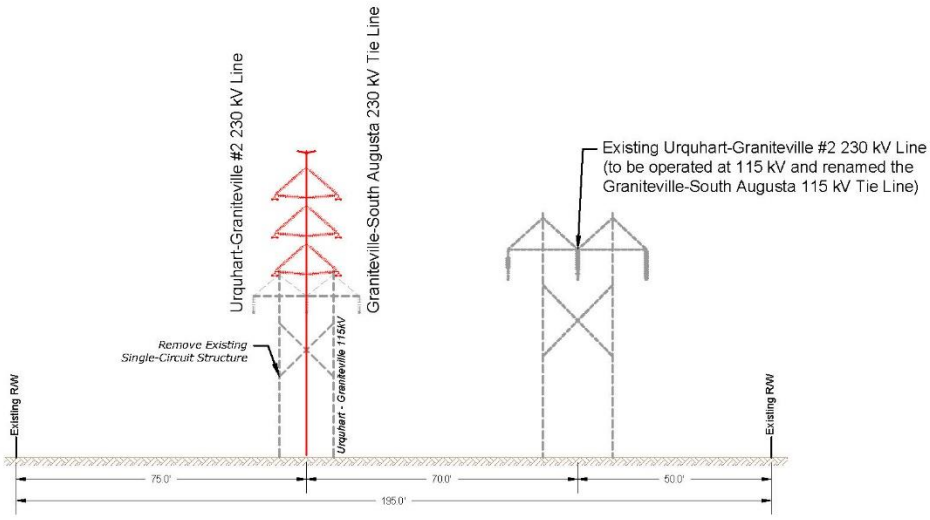


FIGURE 3.1-8
HOWLANDVILLE ROAD to STIEFELTOWN SUBSTATION

Figure 3.1-9 Stiefeltown Substation to Trolley Line Road

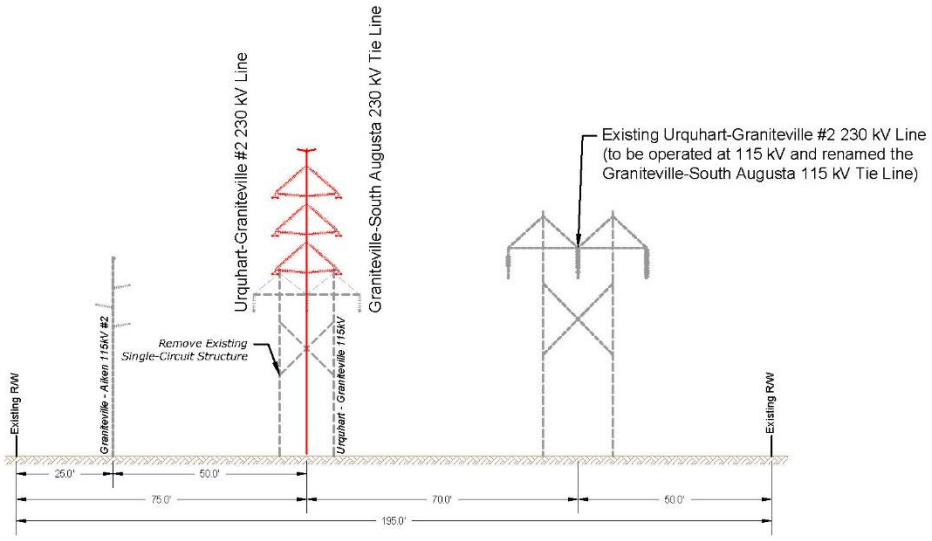


FIGURE 3.1-9
STIEFELTOWN SUBSTATION to TROLLEY LINE ROAD

Figure 3.1-10 Trolley Line Road to Graniteville Substations No. 1 and No. 2

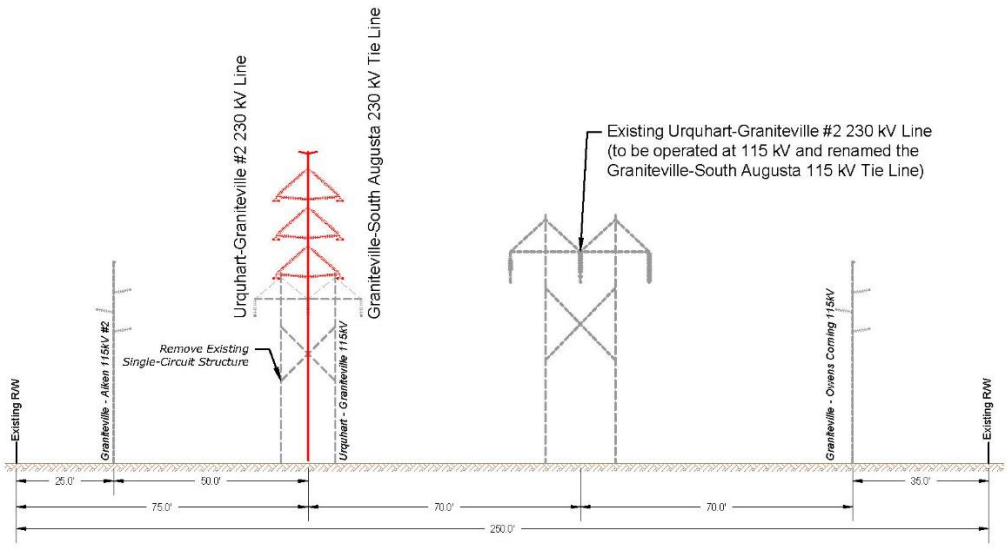


FIGURE 3.1-10
TROLLEY LINE ROAD to GRANITEVILLE SUBSTATIONS 1 & 2

Design and construction of the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line will meet or exceed all applicable requirements of the National Electrical Safety Code edition that are current when the Lines are designed.

The Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line route crosses two U.S. highways, twenty-six state/public roads, six private roads and two railroads. The road and railroad crossings, segmented as to the proposed new right-of-way on the Urquhart Generating Station site and existing right-of-way, are identified in Chart 3.1-1.

Chart 3.1-1 Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line Road and Railroad Crossings

Road/Railroad Crossings (on the Urquhart Generating Station Site)	**Approximate Distance Along the Lines' Route From the 1st Structure on the South Carolina Side of the Savannah River (Miles)**
Urquhart Drive (private; 1st crossing)	0.043
CSX Railway	0.11
Urquhart Drive (private; 2nd Crossing)	0.33
Dunbar Lane (private)	0.52
Road/Railroad Crossings (on the existing right-of-way)	**Approximate Distance Along the Lines' Route From the Urquhart 230 kV Substation**
Cary Drive	0.48
Sand Bar Ferry Road	1.00
Swamp Road	1.20
U.S. Highway 278 (Atomic Road)	1.48
Scarborough Drive	2.39
Beech Island Avenue	2.87
Pine Log Road (1st crossing)	3.91
Atkinson Road (private)	4.45
Bellingham Drive	5.79
Storm Branch Road	6.47
Boyd Pond Road	6.93
Evening Way	7.79
Grand Prix Drive	7.96
Herndon Dairy Road	8.57
Briar Patch Lane	8.85
Puddle Duck Lane (private)	9.42
Glenwood Drive	10.89
Pine Log Road (2nd crossing)	11.46
Hatcher Drive (private)	11.71
Pleasant Point Lane	11.79
Hillman Street	12.22
Legion Road	12.63
Schley Street (1st crossing)	12.76
Schley Street (2nd crossing)	12.85
Howlandville Road	13.18
Golf Course Road	13.62
Dibble Road SW	14.52
Aiken Avenue	14.59
Norfolk Southern Railway	14.96
U.S. Highway 1/78 (Jefferson Davis Highway)	15.00
Gregg Highway	15.67
Trolley Line Road	16.17

4.0 The Affected Environment

SCE&G compiled information on the affected environment by reviewing the published literature, interpreting aerial photography, reviewing Federal, South Carolina and Georgia governmental agency information, and performing field investigations. This chapter describes the general characteristics of the physiographic provinces within which the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line will be located and provides specific information about environmental, land use, cultural and scenic resources in the immediate vicinity of the project. A Geographic Information System ("GIS") was used to analyze, model, and manage data for an area that extended outward 1.25 miles in each direction from the centerline of the proposed Lines for cultural resource data collection and 1.0 mile for protected species data collection. Other data were compiled in the GIS system for the area extending outward 1,000 feet in each direction from the proposed Lines' centerline; selected additional data were compiled for the area within the existing and proposed new right-of-way[6] within which the proposed Lines will be located. This data collection and mapping process allowed a qualitative and quantitative analysis of the likely effects to environmental, land use, cultural and scenic resources that will result from construction of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines.

4.1 Land Use

The existing SCE&G right-of-way within which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built has existed in its current condition (cleared with multiple transmission lines within it) for many decades, and existing land uses have been planned and implemented to accommodate the existing corridor. Likewise, the area surrounding the new approximately 0.92 mile segment of new right-of-way on the Urquhart Generating Station site has been dedicated to power generation for over half a century, and that land use will not be affected by the Lines. Land uses surrounding the corridor (within 1,000 of the proposed Lines) within which Lines will be built include recreational (Clear Water YMCA facility, recreational vehicle park), single-family residential, institutional (church), industrial (power generation, light manufacturing, quarry), commercial (auto dealerships, convenience stores, etc.), power supply (electrical substation), agricultural uses (primarily grass/pasture land), forest land, timber production, and other undesignated uses such as fallow land.

[6] Where the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will share the existing right-of-way with other SCE&G transmission lines, data collection was limited to a 100' wide linear zone where construction of the Lines will occur within the wider right-of-way, except for protected species field studies and delineation of waters of the United States, which were conducted throughout the entire width of the existing SCE&G right-of-way.

Chart 4.1-1 provides a listing of existing land uses and their general locations that are present in the immediate vicinity of the proposed and existing SCE&G right-of-way within which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built.

Chart 4.1-1 Land Uses along the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line Route

From	To	Approx. Distance (miles)	Dominant Land Use(s) in the Immediate Vicinity	Comments
Savannah River	Intersection with Existing Right-of-Way	0.92	Power Generation	This new section of proposed right-of-way resides entirely on the Urquhart Generating Station site
Urquhart 230 kV Substation	Cary Drive	0.47	Power Generation	
Cary Drive	Swamp Road	0.70	Fallow land, single-family residential	Residential use is essentially in the Carry Road corridor and between Sand Bar Ferry and Swamp Roads
Swamp Road	Storm Branch Road	5.25	Undeveloped land including fallow, limited pasture and agricultural production uses, and forest lands	Limited single-family residential uses at a few isolated locations along the route segment
Storm Branch Road	Point north of Boyd Pond Road	0.60	Single-family Residential	Development is primarily in the area near Lake Johnsons
Point north of Boyd Pond Road	Point south of Evening Way	0.52	Forest and fallow land	
Point south of Evening Way	Point north of Grand Prix Drive	0.35	Sparse single-family residential	
Point north of Grand Prix Drive	Herndon Dairy Road	0.40	Forest and fallow land	
Herndon Dairy Road	Glenwood Drive	2.30	Forest and fallow land with very sparse single-family residences at a few locations	
Glenwood Drive	Hillman Street	1.30	Single-family residential	Single-family residential development is associated with two large subdivisions
Hillman Street	Legion Road	0.40	Forest land	
Legion Road	Point just north of Golf Course Road	1.15	Single-family residential	
Point just north of Golf Course Road	Point just south to Trolley Line Road	2.20	Forest and fallow land with limited single-family residential	Residential occurrences are in the vicinity of Dibble Road SW, Augusta Road and U.S. Highway 1/78
Point just south to Trolley Line Road	Line angle point north of Trolley Line Road	0.24	Single-family residential and recreational (YMCA)	
Line angle point north of Trolley Line Road	Graniteville Substations No.1 and No.2	1.30	Timber production	

Existing land uses within 1,000 feet of the Lines' proposed centerline are represented by various figures in this report (*Figures 5.1-A and 5.1-B*).

4.2 Physiography

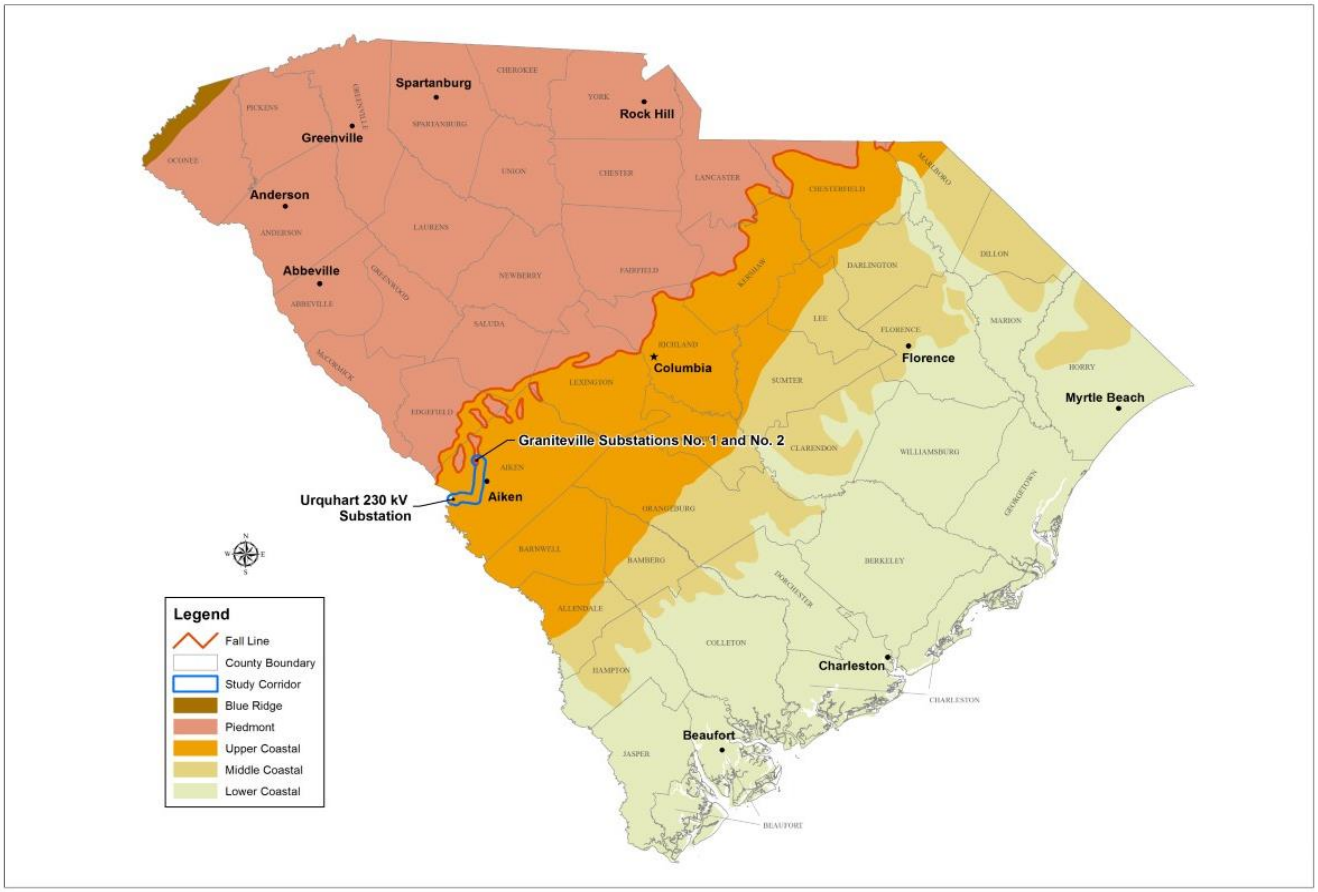
South Carolina covers 32,020 square miles and includes portions of the Blue Ridge, Piedmont and Coastal Plain physiographic provinces. A small area along the northwestern boundary of the State lies in the Blue Ridge province. The Piedmont province occupies the area between the Blue Ridge province and the Coastal Plain province (the Piedmont/Coastal Plain boundary is known as the "Fall Line"). The area between the Fall Line and the Atlantic Ocean is the Coastal Plain province, which is comprised of three sub-provinces (Upper Coastal, Middle Coastal, and Lower Coastal).

The Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line route is located just south of the Fall Line, in the interface region between the Coastal Plain and the Piedmont. This area is known as the "Fall Line Hills District" of the Southern Coastal Plain physiographic province. More specifically, it is located in the middle portion of the Savannah River Valley, a major watershed that slopes from more than 5,000 feet elevation in the Appalachian Mountains to sea level at the Atlantic coast.

The Fall Line of South Carolina marks the common boundary of the Piedmont and Coastal Plain provinces. The Fall Line is a boundary of bedrock geology between the metamorphics of the Blue Ridge and Piedmont with the largely unconsolidated sediments of the coastal plain, but it can also be recognized from stream geomorphology. Falls or rapids are commonly present in streams near the Fall Line; below the Fall Line streams develop much broader flood plains. Elevations in South Carolina range from mean sea level ("MSL") at the coast to 3,560 ft. above MSL on Sassafras Mountain in the Blue Ridge province. Elevations along the Fall Line generally range from 275 feet to 650 feet above MSL.

The Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will reside almost entirely within the Upper Coastal physiographic sub-region of the Coastal Plain province, except for a short segment (approximately ½ mile in length) that will reside in an isolated Piedmont province zone in the area of the Graniteville Substations No. 1 and No. 2. Figure 4.2-1 displays the South Carolina physiographic provinces and the project location in relation to them.

Figure 4.2-1 South Carolina Physiographic Provinces



4.2.1 Coastal Plain Physiographic Province Land Cover

Eight major land cover classifications are defined for the coastal plain, of which six are either unique to the province or reach their greatest extent there. The predominant habitat types that comprise the coastal plain are 1) grassland and early successional habitats, 2) pine woodland, and 3) river bottoms. Although the remaining types are less extensive, they provide habitat diversity that is important to a number of animals, especially wetland-dwelling species. Included below are descriptions of the major land cover classifications in the Coastal Plain physiographic province and the fauna that are common to the habitat provided by the classifications.

Pine Woodland

This classification is used to describe all pine-dominated forests throughout the province, including those occupying a variety of soil moisture characteristics except floodplains. The canopy is dominated by one or several species of pine, generally loblolly pine (*Pinus taeda*), or longleaf (*Pinus palustris*), depending on elevation, soil type and silvicultural history. Dense shrub thickets of hollies (*Ilex* spp.) and wax myrtle (*Morella cerifera*) may be present. Higher elevation pine woodlands have abundant grasses and herbaceous cover, particularly when burning is frequent. Optimal habitat for priority species consists of open stands of longleaf pine, sparse understory and shrub layers, a

ground cover of wiregrass (*Aristida* spp.), and diverse herbaceous species. Wet prairie, grass-sedge bog, herb bog or pitcher plant bog, is typically found in the outer coastal plain on flat sites with a high water table and soil that is saturated for at least part of the year. Vegetation consists of a thin canopy of pines, almost always longleaf (*Pinus palustris*), although loblolly and pond pine (*P. serotina*) may also be present. The understory is essentially absent or very scattered. Herbaceous flora is quite rich, consisting of many grasses and sedges. Pine flatwoods intergrades with pine savanna; like pine savanna, it is pine woodland situated on essentially flat or rolling terrain with sandy soil and a high water table. Unlike pine savanna, pine flatwoods feature a well-developed sub-canopy of several tall shrub species. Pine flatwoods are the principal forest type for much of the lower coastal plain.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	American Kestrel, Bachman's Sparrow, Brown-headed Nuthatch, Henslow's Sparrow, Northern Bobwhite, Red-cockaded Woodpecker, Black Bear, Northern Yellow Bat
High Priority	Eastern Diamondback Rattlesnake, Mimic Glass Lizard, Pine Woods Snake
Moderate Priority	Slender Glass Lizard, Eastern Fox Squirrel, Eastern Woodrat

Sandhill Pine Woodland

Sandhill pine woodland is a variation of pine woodland composed of species adapted to xeric, sandy soils. The type occurs principally in the sandhills but also on sand ridges in the coastal plain. Absent frequent fire, a canopy of longleaf pine and a sub-canopy of turkey oak prevail, interspersed with scrub oak species and scrub/shrub cover. Frequent burning leads to development of longleaf pine-wiregrass communities.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	American Kestrel, Bachman's Sparrow, Brown-headed Nuthatch, Eastern Wood Pewee, Northern Bobwhite, Red-cockaded Woodpecker, Wood Thrush, Coral Snake, Gopher Tortoise, Pine Snake, Southern Hognose Snake
High Priority	Pine Woods Snake
Moderate Priority	Eastern Woodrat, Eastern Fox Squirrel

Upland Forest

Vegetation composition of upland forest is similar to that of oak-hickory forest in the Piedmont, where it is a major vegetation type. Upland forest is rare in the coastal plain, typically occurring on fire-suppressed upland slopes near river floodplains or between rivers and tributaries. It intergrades with river slope communities. Representative canopy trees include white oak (*Quercus alba*), black oak (*Quercus velutina*), post oak (*Quercus stellata*), mockernut hickory (*Carya tomentosa*), pignut hickory (*Carya glabra*), loblolly pine (*Pinus taeda*), flowering dogwood (*Cornus florida*), and black gum (*Nyssa sylvatica*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Eastern Wood Pewee, Kentucky Warbler, Rusty Blackbird, Swainson's Warbler, Swallow-tailed Kite, Wood Thrush, Worm-eating Warbler, Chamberlain's Dwarf Salamander, Black Bear, Northern Yellow Bat
High Priority	Acadian Flycatcher, Bald Eagle, Southeastern Bat, Star-nosed Mole
Moderate Priority	Louisiana Waterthrush, Eastern Woodrat, Eastern Fox Squirrel, Southern Dusky Salamander

Grassland and Early Successional Habitats

A variety of open-land habitats occupy a considerable portion of upland sites in the Piedmont, sandhills and coastal plain, including agricultural land, recently abandoned farmland, recently cleared land, and a matrix of managed open pine forest and grassland. Golf courses, urban yards and open spaces are also included in this habitat type. Vegetation on most sites consist of pine woodland and oak-hickory forest, although many sites are maintained in early successional stages. Agricultural lands with surrounding forest edge habitat occur widely throughout the province and represent the prevailing cover type in the "agriculture belt" that composes most of the inner coastal plain.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Common Ground-Dove, Eastern Meadowlark, Field Sparrow, Grasshopper Sparrow, Loggerhead Shrike, Northern Bobwhite, Painted Bunting
High Priority	High Priority: Barn Owl
Moderate Priority	American Woodcock, Bewick's Wren, Meadow Vole, Eastern Woodrat

Ponds and Depressions

Topographic depressions in the coastal plain support a variety of permanently and semi-permanently flooded isolated freshwater wetlands that have open or closed canopy forest cover. Vegetation cover varies with hydrology, substrate and fire frequency. Depression meadows, pond cypress ponds, swamp tupelo ponds, pocosins and limestone sinks are also included in this habitat type. Landforms include natural and artificial ponds dominated by cypress and/or swamp tupelo, limestone sinks, and Carolina bays. Shrub-dominated pocosins or grass-sedge-herb dominated depression meadows occur on peat- or clay-based substrates, typically in Carolina bays. Absent fire, vegetation in most of these habitats reverts to mixed floodplain hardwood and cypress-tupelo dominated forest. Upslope from these lowland habitats, the transition to well drained uplands supporting pine woodland is often abrupt.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Highest Priority: Little Blue Heron, Yellow-crowned Night-Heron, Flatwoods Salamander, Tiger Salamander, Carolina Gopher Frog, Broad-striped Dwarf Siren, Chamberlain's Dwarf Salamander
High Priority	High Priority: Black Swamp Snake, Chicken Turtle, Florida Cooter, Florida Green Watersnake, Florida Softshell Turtle, Gulf Coast Mud Salamander, Yellowbelly Turtle, Upland Chorus Frog, Mink, Southeastern Bat
Moderate Priority	Moderate Priority: Great Blue Heron, Great Egret, Common Snapping Turtle, Spotted Turtle, Southern Dusky Salamander, Northern Cricket Frog

Hardwood Slopes and Stream Bottoms

A complex of hardwood and hardwood-pine communities occupies the floodplains of small streams, mesic bluffs and infrequently flooded flats in association with streams or rivers. Fire is infrequent, due either to the sheltered locations of these communities on bluffs or their isolation within a floodplain. Several mixed mesophytic subtypes characterized by the presence of American beech *(Fagus grandifolia)* occur in sheltered sites with moist soils, particularly on north-facing river bluffs and on slopes of drains and creeks. On upland flats within floodplains (hammocks), southern magnolia *(Magnolia grandiflora)* frequently shares dominance with American beech. The calcareous cliff and marl forest subtype occurs on circumneutral soils derived from limestone or unconsolidated calcareous substrates such as marl. Forest structure of all subtypes is diverse, with understory, shrub and herbaceous species varying according to soil moisture and chemistry. All subtypes intergrade with blackwater stream forest or river bottom forest on lowland sides and with upland forest on upland sides.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Black-throated Green Warbler, Eastern Wood Pewee, Kentucky Warbler, Rusty Blackbird, Swainson's Warbler, Swallow-tailed Kite, Wood Thrush, Worm-eating Warbler, Chamberlain's Dwarf Salamander, Black Bear, Northern Yellow Bat
High Priority	Acadian Flycatcher, Bald Eagle, Southeastern Bat, Star-nosed Mole
Moderate Priority	Louisiana Waterthrush, Eastern Woodrat, Eastern Fox Squirrel, Southern Dusky Salamander

Blackwater Stream Systems

Tributary streams in the sandhills and coastal plain are commonly known as "blackwater streams" for the color of tannins leaching from decaying vegetation. Forests on the narrow floodplains formed by these streams typically have a canopy dominated by swamp tupelo *(Nyssa biflora)* and red maple *(Acer rubrum)*. On broader sites, bald cypress *(Taxodium distichum)* can become an important canopy species. Tulip poplar *(Liriodendron tulipifera)*, sweet gum *(Liquidambar styraciflua)*, pond pine *(Pinus serotina)*, loblolly pine *(Pinus taeda*), and laurel oak *(Quercus laurifolia)* are important associates. The shrub layer is open in areas subjected to the most flooding, or it can be fairly dense and pocosin-like in areas subject to infrequent flooding. Headwaters and

wet flats immediately above the floodplain can support dense, pocosin-like shrub thickets or, under suitable fire conditions, pure stands of Atlantic white cedar (*Chamaecyperus thyoides*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Kentucky Warbler, Eastern Wood Pewee, Rusty Blackbird, Swainson's Warbler, Wood Thrush, Yellow-crowned Night Heron
High Priority	Acadian Flycatcher, Black Swamp Snake, Spiny Softshell Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat
Moderate Priority	American Woodcock, Louisiana Waterthrush, Wood Duck, Spotted Turtle

River Bottoms

River bottoms, or "bottomland forests," consist of hardwood-dominated woodlands with moist soils that are usually associated with the broad floodplains of major rivers in the Piedmont or Blue Ridge. Locally, the floodplains of major coastal plain rivers are significant components of the landscape. Characteristic trees include sweetgum (*Liquidambar styraciflua*), loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), willow oak (*Quercus phellos*), laurel oak (*Quercus laurifolia*), cherrybark oak (*Quercus pagoda*), and American holly (*Ilex opaca*). A subtype dominated by bald cypress (*Taxodium distichium*) and water tupelo (*Nyssa aquatica*) occurs on lower elevation sites interspersed and intergrading with oak-dominated woodlands. Dominant trees are bald cypress (*Taxodium distichium*) and water tupelo (*Nyssa aquatica*), swamp gum (*Nyssa biflora*), Carolina ash (*Fraxinus caroliniana*), water elm (*Planera aquatica*), and red maple (*Acer rubrum*).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Black-throated Green Warbler, Kentucky Warbler, Little Blue Heron, Rusty Blackbird, Swainson's Warbler, Yellow-crowned Night Heron, Black Bear, Northern Yellow Bat
High Priority	Acadian Flycatcher, American Alligator, Black Swamp Snake, Gulf Coast Mud Salamander, River Cooter, Spiny Softshell Turtle, Striped Mud Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat, Star-nosed Mole
Moderate Priority	American Woodcock, Great Blue Heron, Great Egret, Louisiana Waterthrush, Wood Duck, Bird-voiced Treefrog, Common Snapping Turtle, Spotted Turtle, Eastern Woodrat, Eastern Fox Squirrel

4.2.2 Piedmont Physiographic Province Land Cover

The rolling uplands of the Piedmont landscape are predominantly a mosaic of agricultural land and managed woodland, with a history of clearing and economic use that dates back to the earliest times of European settlement. Hardwood-dominated forests occupy relatively narrow floodplains and scattered upland sites, while pine and pine-hardwood forests occupy the majority of forested upland sites.

Included below are descriptions of the major land cover classifications in the Piedmont physiographic province and the fauna that are common to the habitat provided by the classifications.

Oak-hickory Forest

Occurring throughout the state but most characteristic of rolling uplands in the Piedmont, oak-hickory forest is a widely distributed community that varies from site to site. Occurring in highly fragmented stands, later successional stages tend to be made up of a diverse assemblage of hardwoods, primarily oaks and hickories, as co-dominants in combination with pines. Understory, shrub and herbaceous layers are present in varying degrees, represented by diverse woody and non-woody species. Vegetation on most sites consists of early- to mid-successional managed stands of pine and pine-hardwood forest. The understory in pure pine stands is often open, but in mixed or older stands, it is dominated by the hardwoods characteristic of the site. Common pine species of the Piedmont include shortleaf (Pinus echinata) and loblolly (P. taeda), with the former better adapted to dry, fine textured upland soils and loblolly achieving maximum growth on deep soils with good moisture and drainage.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	American Kestrel, Eastern Wood Pewee, Red-cockaded Woodpecker, Wood Thrush, Pine Snake
High Priority	Pine Woods Snake
Moderate Priority	Scarlet Tanager, Eastern Fox Squirrel

River Bottom Forest

River bottoms, or "bottomland forests," consist of hardwood-dominated woodlands with moist soils that are usually associated with major river floodplains. Characteristic trees include sweetgum (Liquidambar styraciflua), loblolly pine (Pinus taeda), water oak (Quercus nigra), willow oak (Quercus phellos), laurel oak (Quercus laurifolia), cherrybark oak (Quercus pagoda), and American holly (Ilex opaca). A subtype dominated by bald cypress (Taxodium distichium) and water tupelo (Nyssa aquatica) occurs on some lower elevation sites in the southern section on the Piedmont province, but is not as prevalent as in the broader floodplains of the coastal plain. Compared to the coastal plain, the floodplains of major rivers in the Piedmont are confined by topography to relatively narrow corridors.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Black-throated Green Warbler, Kentucky Warbler, Little Blue Heron, Rusty Blackbird, Swainson's Warbler, Yellow-crowned Night Heron, Black Bear, Northern Yellow Bat
High Priority	Acadian Flycatcher, American Alligator, Black Swamp Snake, Gulf Coast Mud Salamander, River Cooter, Spiny Softshell Turtle, Striped Mud Turtle, Mink, Rafinesque's Big-eared Bat, Southeastern Bat, Star-nosed Mole
Moderate Priority	American Woodcock, Great Blue Heron, Great Egret, Louisiana Waterthrush, Wood Duck, Bird-voiced Treefrog, Common Snapping Turtle, Spotted Turtle, Eastern Woodrat, Eastern fox squirrel

Piedmont Small Stream Forest

Piedmont small stream forests are distinguished from forest communities on larger floodplains because of differences between the scales of the ecosystems. In smaller floodplains, the

levees, sloughs and ridges are largely absent or poorly developed. Flooding regime is also more variable between small watersheds than larger ones. Soils are various alluvial types that are seasonally or intermittently flooded. The forest has an open-to dense understory or shrub layer and a sparse to dense herb layer. The canopy has a mixture of bottomland and mesophytic trees including river birch (Betula nigra), sycamore (Platanus occidentalis), sweetgum (Liquidambar styraciflua), tulip tree (Liriodendron tulipifera), American elm (Ulmus americana), hackberry (Celtis laevigata), green ash (Fraxinus pennsylvanica), and red maple (Acer rubrum).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Kentucky Warbler, Little Blue Heron, Rusty Blackbird, Wood Thrush, Yellow-crowned Night Heron, Tiger Salamander
High Priority	Acadian Flycatcher, River Cooter, Spiny Softshell Turtle, Yellowbelly Turtle, Mink, Swamp Rabbit
Moderate Priority	Great Blue Heron, Great Egret, Louisiana Waterthrush

Cove Forest

Cove forests are botanically diverse, well-developed hardwood forests occurring on scattered rich and generally small sites that are less than 200 acres. Usually, these forests occur on protected bluffs in association with small stream forests or river bottoms. No single species tends to dominate. Shrub species are usually numerous and the herbaceous flora is fairly rich, with many spring ephemerals. Canopy and understory is composed of hardwoods including beech (Fagus grandifolia), tulip tree (Liriodendron tulipifera), black gum (Nyssa sylvatica), sourwood (Oxydendrum arboreum), white oak (Quercus alba), northern red oak (Q. rubra), black oak (Q.velutina), sweetgum (Liquidambar styraciflua), red maple (Acer rubrum), southern sugar maple (Acer saccharum), basswood (Tilia heterophylla), ironwood (Carpinus caroliniana), flowering dogwood (Cornus florida), American holly (Ilex opaca), witch-hazel (Hamamelis virginiana), and hop-hornbeam (Ostrya virginiana).

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Eastern Wood Pewee, Kentucky Warbler, Wood Thrush, Webster's Salamander
High Priority	Four-toed Salamander
Moderate Priority	Scarlet Tanager

Grassland and Early Successional Habitats

A variety of open habitats occupies a considerable portion of upland sites in the Piedmont, including agricultural land, recently abandoned farmland, recently cleared land, and a matrix of managed open pine forest and grassland. Golf courses, urban yards and open spaces are also included in this habitat type. The vegetation on most sites is oak-hickory forest, although many sites are maintained in early successional stages.

Associated Wildlife Species (SC Department of Natural Resources Priority List)

Highest Priority	Eastern Meadowlark, Field Sparrow, Grasshopper Sparrow, Loggerhead Shrike, Northern Bobwhite, Southern Hognose Snake
High Priority	Barn Owl, Meadow Vole
Moderate Priority	American Woodcock, Bewick's Wren

General Condition of Piedmont Land Cover Types

To a greater degree than in other provinces, the vegetation in the Piedmont has been altered by human activity. Cotton agriculture changed much of the original hardwood and shortleaf pine (Pinus echinata) forests into fields. Fields eroded, often losing all topsoil. By the 1930's, various factors, including the Great Depression and boll weevil outbreaks in addition to severe erosion, led to widespread farmland abandonment in the Piedmont.

Loblolly pine (Pinus taeda) was introduced to the Piedmont during the nineteenth century as a cash lumber crop; this pine now dominates much of the province. According to a U.S. Forest Service survey, loblolly-dominated pine forests occupy over two million acres in South Carolina's Piedmont province (Conner and Sheffield 2000). Although loblolly pine plantations are found throughout the province, they are much more prevalent in the southwestern Piedmont.

Land cover types and quantities within 1,000 feet of the Lines' route are presented in Chart 4.2-1.

Chart 4.2-1 Land Cover Types and Quantities within 1,000 feet of the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line

Land Cover Type	Acres
Barren	53.6
Bottomland/Floodplain/Hardwood Forest	152.4
Cropland	126.5
Grass/Pasture	1,217.3
Mixed Hardwood/Pine Forest	467.9
Pine Forest (almost exclusively loblolly pine)	1,230.7
Scrub/Shrub	695.3
Urban/Built-up	364.6
Water	80.8
Wetland	83.8

The dominant land cover types in the vicinity of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route are pine forests, grass/pasture land and, to a lesser extent, shrub/scrub. The cleared right-of-way within which the Lines will be built includes grass/pasture and scrub/shrub, which are land cover types commonly found in transmission line rights-of-way where vegetative control practices are designed to preclude the presence of species that would eventually interfere with the safe, reliable operation of transmission lines.

4.3 Surface Water Hydrology

The route for the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines resides in three watersheds, all within the Savannah River drainage basin (Middle Savannah River sub-basin). The waters crossed by the Lines and the watersheds they reside in are shown in Chart 4.3-1.

Chart 4.3-1 Watersheds and Waters Crossed by the Graniteville-South Augusta 230 kV Tie Line and Urquhart-Graniteville #2 230 kV Line

Drainage Basin	Sub-Basin	Watershed	Length of Lines' Route in the Watershed (Approximate Miles)	Waters Crossed by the Lines in the Watershed	Navigable Waters as Classified by SCDHEC?
Savannah River	Middle Savannah River	Horse Creek	5.8	Bridge Creek	No
				Sand River	No
		Hollow Creek	8.3	Town Creek (2 crossings)	No
				Lake Johnsons	No
		Augusta Canal-Savannah River	4.0	Badger Branch	No
				Small Unnamed Pond	No

All waters crossed by the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines are classified by the South Carolina Department of Health and Environmental Control ("SCDHEC") as "Freshwaters." SCDHEC defines freshwaters as follows: *"Suitable for primary and secondary contact recreation, a source for drinking water after conventional treatment in accordance with the requirements of SCDHEC, suitable for fishing and the survival and propagation of a balanced indigenous aquatic community of fauna and flora, and suitable for industrial and agricultural uses."*

Precipitation is the basic source of water resources in Aiken County, South Carolina, and the historical average annual precipitation rate in the county is 46.6 inches. Substantial deviation (10 inches or greater) from the average annual precipitation rate is infrequent; however, the region experienced unusually prolonged droughts in 1954-55, 1968-1969, 1986, 1996, 1998-2002, 2007-2008 and 2011. Historically, annual precipitation is fairly well distributed throughout the region, with the months of January, February, March, June, July, August and September being the wettest, with monthly averages around 5 inches; averages for the remaining months range between 3 and 4 inches. Snowfall in Aiken County is infrequent, and the annual average accumulation is 0.9 inches.

Between April and July 2014, Palmetto Environmental Consulting, Inc. ("PEC"), on behalf of SCE&G, conducted a jurisdictional waters/wetlands delineation in the existing right-of-way within which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built. On February 10, 2017, PEC augmented the study by conducting a jurisdictional waters/wetlands delineation in the proposed new right-of-way corridor on the Urquhart Generating Station site. During the delineations, wetland boundaries were marked and surveyed using a Trimble GeoXT global positioning system

unit. Mapping was created depicting the boundaries of jurisdictional waters and wetlands and used to determine that approximately 12.8 acres of wetlands, approximately 1.7 acres of open water and approximately 2,010 linear feet of stream channels are present in the existing and proposed rights-of-way.

SCE&G regularly maintains its transmission line rights-of-way to prevent vegetation growth that would interfere with the safe, reliable operation of transmission lines; therefore, no forested wetlands are present in the existing right-of-way, and, likewise, none are present in the proposed right-of-way on the Urquhart Generating Station site. The wetlands in the right-of-way are primarily herbaceous wetlands. They are relatively few and scattered, and are generally small in size (less than 1 acre). Wetland vegetation consists of dozens of species, some of the most common being bushy bluestem (*Andropogon glomeratus*), plume grass (*Erianthus contortus*), giant cane (*Arundinaria gigantea*), cinnamon fern (*Osmunda cinnamomea*), netted chain fern (*Woodwardia areolata*), common rush (*Juncus effusus*), tearthumb (*Polygonum sagittatum*), and various sedges (*Carex sp.*) and grasses. Vines consist of muscadine (*Vitis rotudifolia*), roundleaf greenbrier (*Smilax rotundifolia*), and laurel greenbrier (*Smilax laurifolia*).

4.4 Wildlife

Land use and natural plant communities strongly influence wildlife diversity in the vicinity of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route. The bottomland forests of the area offer habitat for white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), and wild turkey (*Meleagris gallopavo*). Other representative species in this area include the gray squirrel (*Sciurus carolinensis*), gray fox (*Urocyon cinereoargenteus*), opossum (*Didelphis virginiana*), prothonotary warbler (*Protonotaria citrea*), Carolina wren *(Thryothorus ludovicianus*), Carolina chickadee (*Poecile carolinensis*), red-shouldered hawk (*Buteo lineatus*), parula warbler (*Parula americana*), green frog (*Rana clamitans*), bird-voiced tree frog (*Hyla avivoca*), box turtle (*Terrapene carolina*), and black racer (*Coluber constrictor*).

The mixed hardwood/pine and pine forests provide habitat that supports the eastern diamondback rattlesnake (*Crotalus adamanteus*), green anole (*Anolis carolinensis*), northern cardinal (*Cardinalis cardinalis*), bobwhite quail (*Colinus virginianus*), and eastern fox squirrel *(S. niger*). Other representative species found in the forested areas of the region include the white-tailed deer, cottontail rabbit (*Sylvilagus floridanus*), wild turkey, red-tailed hawk (*Buteo jamaicensis*), pine warbler (*Dendroica pinus*), eastern towhee (*Pipilo erythrophthalmus*), pine snake (*Pituophis melanoleucus*), oak toad (*Bufo quercicus*), and flatwoods salamander (*Ambystoma cingulatum*).

Common in recent clear-cut areas in the vicinity of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route and in the existing right-of-way are scrub/shrub communities. The representative species found in these areas include the eastern garter snake (*Thamnophis sirtalis*), rough green snake (*Opheodrys aestivus*), red-tailed hawk, Carolina wren, northern mockingbird (*Mimus polyglottos*), yellow-breasted chat (*Icteria virens*), eastern cottontail, golden mouse (*Peromyscus nuttalli*), and white-tailed deer.

4.5 Fisheries

The perennial streams crossed by the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route are typical of South Carolina's lower piedmont / upper coastal plain freshwater streams where an abundance of finfish and mussels are present. The Savannah River (including the Augusta Canal) is the major waterway in the vicinity of the Lines' route. In the "Fall Line Hills District" of the middle segment of the Savannah River Valley (the region in which the Lines will be located), the Savannah River supports an important sport fishery for warmwater species that include largemouth bass, crappie, striped bass, spotted bass, bluegill, redbreast sunfish, catfish, American eel, shortnose sturgeon, chain pickerel, bowfin and longnose gar.

Flood control lakes and farm ponds throughout the region provide habitats for largemouth bass, common bream, sunfish and catfish.

4.6 Protected Species Literature and Records Search

PEC conducted a protected species literature and records searches in September 2014 and February 2017 to determine the presence of known occurrences of federally and state-listed animal and plant species on or within one mile of the existing and proposed right-of-way within which the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line will be located. The literature and records search included review of the following resources:

- The USFWS South Carolina List of At-Risk, Candidate, Endangered, and Threatened, and Species of Concern for Aiken County , last updated January 11, 2017;
- The SCDNR Heritage Trust Program's Rare, Threatened, and Endangered Species Database GIS layer, last updated October 2016; and,
- The SCDNR list of Rare, Threatened, and Endangered Species Known to Occur in Aiken County, last updated June 11, 2014.

The literature and records search conducted by PEC in September 2014 and February 2017 is summarized in Chart 4.6-1. The findings of PEC's protected species investigations within the existing and proposed rights-of-way within which the Lines will be built is discussed in Chapter 5.

Chart 4.6-1 Summary of Protected Species Literature and Records Search

Common Name	Scientific Name	State/Federal Status or Rank	Last Observed	Comments
Red-cockaded woodpecker	*Picoides borealis*	FE/SE	1975-1984	Four occurrences within one mile of project area. Not found in 1987—determined extirpated.
Bog spicebush	*Lindera subcoriacea*	S3	1995	One occurrence within one mile of project area.
Sweet pitcher-plant	*Sarracenia rubra*	S3/S4	1995	One occurrence adjacent to Graniteville Substation
Piedmont water-milfoil	*Myriophyllum laxum*	S2	1983	One occurrence within one mile of project area.
Red standing-cypress	*Ipomopsis rubra*	S2	1981	Project area is within one mile of a one-square mile area of an occurrence.

Seventy-one (71) species of federally- and state-listed plants and animals either occur or potentially occur in Aiken County, South Carolina. These species, as well as the results of the records search and protected species field investigation over the existing and proposed rights-of-way, are summarized in the following two reports prepared by PEC: 1) *"Federally-Listed Threatened and Endangered Species/State Rare, Threatened, and Endangered Species Assessment and Jurisdictional Waters/Wetlands Assessment (for the) Proposed Graniteville-South Augusta / Urquhart-Graniteville #2 Lines, Aiken County, South Carolina"* and 2) a letter report entitled *"Letter of Findings for Graniteville-South Augusta 230kV Tie Line Update of Protected Species Assessment for Urquhart-Graniteville #2 230kV Line"* dated February 21, 2017, which summarizes the investigation within the existing and new right-of-way on the Urquhart Generating Station site (*Appendix B*). Because of the large number of species listed in Aiken County, the PEC reports only address those species for which appropriate habitat is located within the existing and proposed rights-of-way in which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built.

4.7 Cultural Resources

In March 2014, Brockington and Associates, Inc. ("Brockington"), a national cultural resources consulting firm headquartered in Norcross, Georgia, with an office in Charleston, South Carolina, conducted background research to determine previously recorded architectural and archaeological resources within 1.25 miles of the existing right-of-way within which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be located.[7] Additionally, the scope of Brockington's investigation included a "windshield reconnaissance survey" to identify any previously unrecorded architectural resources within 1.25 miles of the Lines' route that appear potentially eligible for listing in the National Register of Historic Places ("NRHP"). The area of the cultural resource investigation within 1.25 miles of the Lines' centerline contains approximately 47 square miles in Aiken County, South Carolina, and 1.0 square mile in Richmond County, Georgia.

[7] In February 2017, Brockington was engaged to conduct a Phase I Archaeological investigation along the approximately 0.92 mile line segment on the Urquhart Generating Station site. The results of this investigation and the results of the Phase I Archaeological investigation within the existing right-of-way are presented in Chapter 5 of this report.

The findings of the background research and windshield reconnaissance survey along the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route are summarized below.

Archaeology

Brockington conducted the archaeological site search for the area within 1.25 miles of the centerline of the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line using Archsite, South Carolina's online cultural resources GIS database, and Georgia's Natural, Archaeological, and Historic Resources GIS ("GNAHRGIS"). These database systems provide information on previous cultural resource surveys as well as previously recorded archaeological sites. The recorded sites within 1.25 miles of the future Lines' centerline are summarized according to their National Register of Historic Places ("NRHP") status in Chart 4.7-1.

Chart 4.7-1: Classifications of Previously Recorded Archaeological Sites within 1.25 Miles of the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line Route

Archaeological Resource NRHP Classifications	Quantity
Listed on the NRHP	2 (Historic Forts)
Associated with NRHP Listed Property	1 (Historic Plantation)
Potentially Eligible for Listing on the NRHP	2
Recorded but Not Assessed for NRHP Listing Eligibility	3
Not Eligible for Listing on the NRHP	1

Architecture

Brockington conducted a literature review to determine all previously recorded architectural resources within 1.25 miles of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' centerline. The review of digital file records at the South Carolina Department of Archives and History ("SCDAH") and the review of Georgia's online records revealed that fifty-seven (57) previously recorded architectural resources reside within 1.25 miles of the future Lines, but none occur in the right-of-way. Chart 4.7-2 summarizes the findings of the architectural records review.

Chart 4.7-2: Classifications of Previously Recorded Individual Architectural Resources within 1.25 Miles of the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line Route

Individual Resource NRHP Classifications	Quantity
Listed on the NRHP	5 (includes 2 historic districts and 3 individual architectural resources)
Eligible for Listing on the NRHP	5
Not Eligible for Listing on the NRHP	47

Windshield Reconnaissance Survey

In addition to the records review to determine the locations and NRHP status of all previously recorded architectural resources within 1.25 miles of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route, Brockington conducted a "windshield reconnaissance survey" on May 12-14, 2014, throughout the area within 1.25 miles of the Lines' route. The windshield reconnaissance survey consisted of an inspection of architectural resources visible from all publicly accessible roads within 1.25 miles of the Lines' route. It is important to note that topographic and aerial maps often indicate resources located along private roads as well as abandoned and existing field roads. If a previously recorded resource was found to be inaccessible, Brockington examined current aerial photographs to make a reasonable determination as to whether or not the resource is still in existence. The purpose of the windshield reconnaissance survey was to accomplish the following three objectives:

1. Evaluate all previously recorded architectural resources;
2. Locate architectural resources not previously recorded that appear to meet the minimum fifty-year age requirement for the NRHP; and,
3. Identify potentially eligible NRHP properties, including structures and historic districts.

As discussed above, SCDAH an GNAHRGIS records revealed that fifty-seven (57) previously recorded above ground resources (3 NHRP listed individual architectural properties, 2 NRHP listed districts, 5 individual architectural properties eligible for NHRP listing and 47 resources not eligible for NRHP listing) reside within 1.25 miles of the future Lines. None of the fifty-seven (57) previously listed sites are within the existing or proposed right-of-way in which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built. During the windshield survey, Brockington identified seven previously unrecorded individual architectural resources and one historic district in west Graniteville that appear to retain sufficient architectural integrity to be considered eligible for listing in the NRHP. Numerous other properties were observed throughout the study area during the windshield reconnaissance survey that appear to be 50 years old (thus, meeting the minimal standard for NRHP eligibility consideration); however, due to significant alterations or modifications, these properties appear to have lost their architectural integrity and may not meet eligibility criteria for listing on the NRHP under Criterion C. The presence of above ground cultural resources (individual architectural and district architectural) within 1.25 miles of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route as identified by the background records review and during the windshield reconnaissance survey are summarized in Chart 4.7-4.

Chart 4.7-4: Classifications of All Architectural Resources within 1.25 Miles of the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line Route, Including Previously Recorded Resources and Resources Documented During the Windshield Reconnaissance Survey

Resource NRHP Classifications Reflecting Findings of the Windshield Survey	Quantity
Individual Architectural Properties Listed on the NRHP	3
Historic Districts Listed on the NRHP	2
Individual Architectural Properties Eligible for Listing on the NRHP	12
Historic Districts Eligible for Listing on the NRHP	1
Not Eligible for Listing on the NRHP	47
Total	**65**

Brockington summarized the findings of the cultural resources background research and windshield reconnaissance survey for the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line in a letter report dated May 21, 2014, which is included in this report (*Appendix C*).

In addition to the cultural resources background research and windshield reconnaissance survey, Brockington conducted a comprehensive Phase I archaeological survey from April 28 through May 9, 2014, throughout the portion of the existing right-of-way within which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built. This portion of right-of-way was comprised of a 100 feet wide linear corridor (50 feet on each side of the proposed Lines). Also, from February 16 through February 17, 2017, Brockington conducted a comprehensive Phase I archaeological survey throughout the combination of existing and new right-of-way that comprise the 100 feet wide corridor the Lines will run within on the Urquhart Generating site. The 2014 and 2017 field investigations determined that no archaeological resources on or eligible for listing on the NRHP will be affected by the proposed Lines. Brockington prepared a report dated September 2014 entitled *Phase I Archaeological Resources Survey of the 17.6 Mile Urquhart-Graniteville Transmission Line Corridor* and an addendum report dated February 27, 2017 entitled *Archaeological Survey of the Graniteville-South Augusta 230 kV Tie Line at the Urquhart Generating Station Site, Aiken County, South Carolina* that describes the methodology and findings of the 2014 and 2017 Phase I archaeological surveys (*Appendix C*).

4.8 Visual Resources

The degree to which a planned transmission line will affect the scenic quality of the area or region through which it passes is directly related to the scenic quality of the area or region (i.e., the higher the scenic quality, the greater the potential for adverse visual impacts and vice versa). Scenic

quality is derived from the interrelationship of multiple factors including landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Using these factors, the United States Bureau of Land Management ("BLM") developed a visual resource inventory methodology for the purpose of rating the scenic quality of federal lands under its jurisdiction. The BLM methodology is a system whereby the visual quality of land areas can be scored on a numeric scale by considering and rating the interrelationship of multiple visual factors associated with specific areas. The factors include those which contribute to the scenic content and quality of specific areas including landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.

On SCE&G's behalf, landscape architects and professional geographers employed by UC Synergetic, LLC ("UCS") executed the BLM scenic quality methodology to assess and rate the scenic quality of seven specific areas within which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be constructed. The seven areas include sections of the Lines' route that were delineated to include scenic factor similarities that are generally specific to each individual area and are not necessarily prevalent in adjacent areas.

Chart 4.8-1, adopted from the BLM's Visual Resource Rating System, provides information about the criteria used to assess scenic quality in each of the seven delineated areas along the Lines' route.

Chart 4.8-1: Scenic Quality Rating Criteria

Explanation of Rating Criteria
Landform
Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, (for example, the Grand Canyon) or they may be exceedingly artistic and subtle as certain badlands, pinnacles, arches, and other extraordinary formations.
Vegetation
Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller scale vegetational features, which add striking and intriguing detail elements to the landscape (e.g., gnarled or wind-beaten trees, and Joshua trees).
Water
That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.
Color
Consider the overall color(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "color" are variety, contrast, and harmony.
Adjacent Scenery
Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance that adjacent scenery will influence scenery within the rating unit will normally range from 0-5 miles, depending upon the characteristics of the topography, vegetative cover, and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.
Scarcity
This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.
Cultural Modifications
Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit. Rate accordingly.

The scenic quality rating criteria were used to evaluate and score the seven delineated areas according to each one's unique scenic quality as measured and evaluated by the seven scenic quality criteria explained in Chart 4.8-1. Guidance for scoring defined areas for each scenic quality rating criterion is provided in Chart 4.8-2.

Chart 4.8-2: Scenic Quality Inventory and Evaluation Chart

Key Factors	Rating Criteria and Score	Rating Criteria and Score	Rating Criteria and Score
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features that are dominant and exceptionally striking and intriguing such as glaciers. **5**	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. **3**	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. **5**	Some variety of vegetation, but only one or two major types. **3**	Little or no variety or contrast in vegetation. **1**
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. **5**	Flowing, or still, but not dominant in the landscape. **3**	Absent, or present, but not noticeable. **0**
Color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. **5**	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. **5**	Adjacent scenery moderately enhances overall visual quality. **3**	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc.* **5+**	Distinctive, though somewhat similar to others within the region. **3**	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. **2**	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**	Modifications add variety but are very discordant and promote strong disharmony. **-4**

Note: Score values within each Key Factors category range from minimum to maximum scores for the key factor. It is possible to assign any numeric score within the minimum to maximum range based on scenic quality conditions observed.

***** *A rating greater than 5 can be given to this criterion in the scarcity category but should be supported by written documentation.*

By applying the appropriate rating criteria and scores for each of the key factors shown in Chart 4.8-2 based on actual scenic conditions present along the Graniteville-South Augusta /

Urquhart-Graniteville #2 Lines' route, total scores were derived for each of the seven individual sections of the Lines' route that indicate the scenic quality of each section. The following is the BLM explanation of scenic quality, which is indicated by the total scores:

Total Score	**Scenic Quality**
19 or higher	High Scenic Quality
12-18	Moderate Scenic Quality
11 or lower	Low Scenic Quality

Scoring Methodology

UCS, on SCE&G's behalf, conducted a GIS analysis of vegetation, hydrography, land use, and topography along the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route to gain insight into key scenic quality factors including landform, vegetation, water, color, and influence of adjacent scenery. Additionally, a windshield survey was conducted to observe, record, and photograph visual conditions along public roads in the immediate vicinity of the Lines' route. As previously explained, the Lines' route was segmented into seven sections based on similarity of scenic conditions represented by each section. Finally, each section was scored using the BLM scoring protocol. The following is a listing of the seven scenic quality sections along the Lines' route, which are shown in Figure 4.8-1:

Scenic Quality Section 1: Graniteville Substations No. 1 and No. 2 to Trolley Line Road

Scenic Quality Section 2: Trolley Line Road to Pine Log Road

Scenic Quality Section 3: Pine Log Road to Herndon Dairy Road

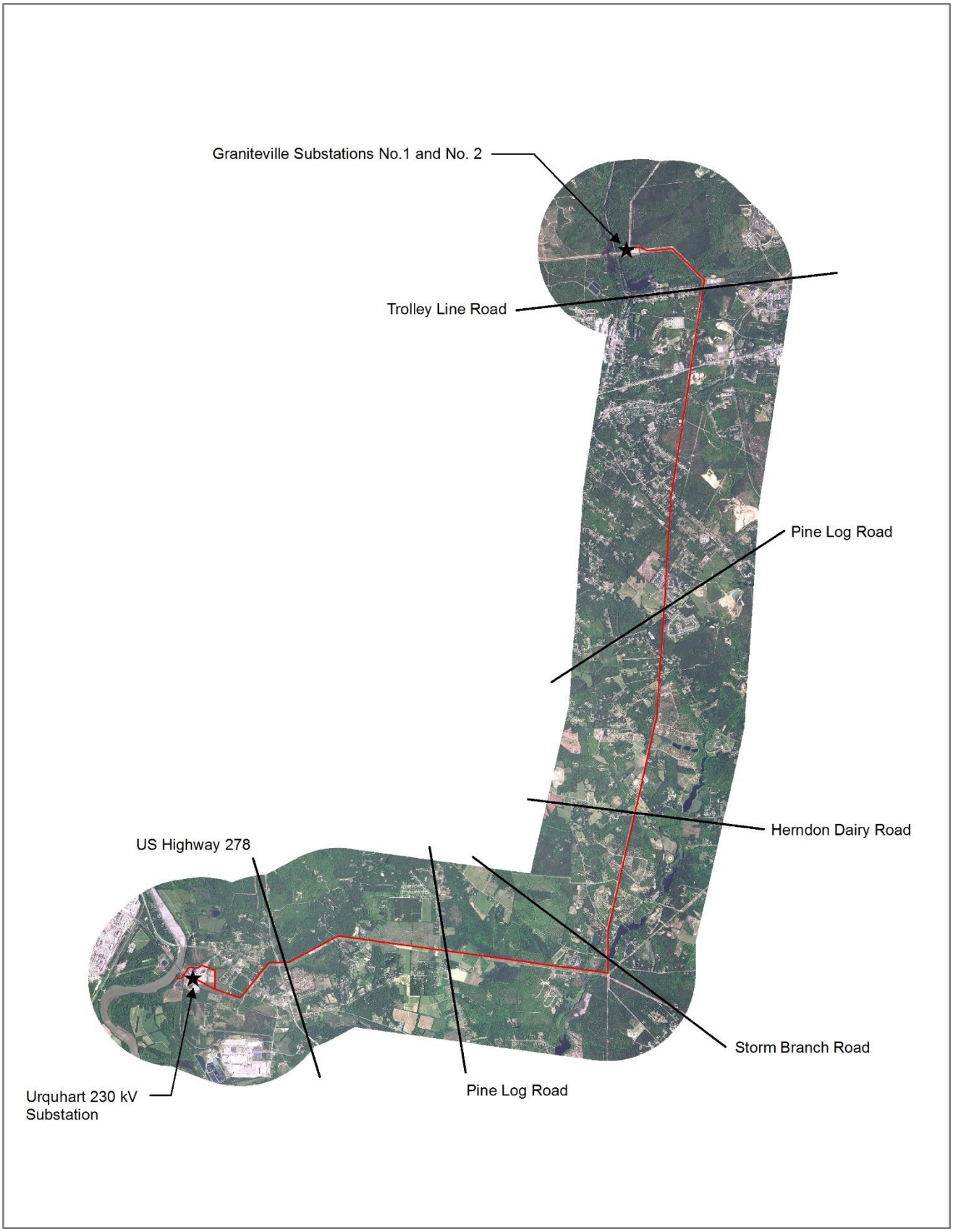
Scenic Quality Section 4: Herndon Dairy Road to Storm Branch Road

Scenic Quality Section 5: Storm Branch Road to Pine Log Road

Scenic Quality Section 6: Pine Log Road to U.S. Highway 278

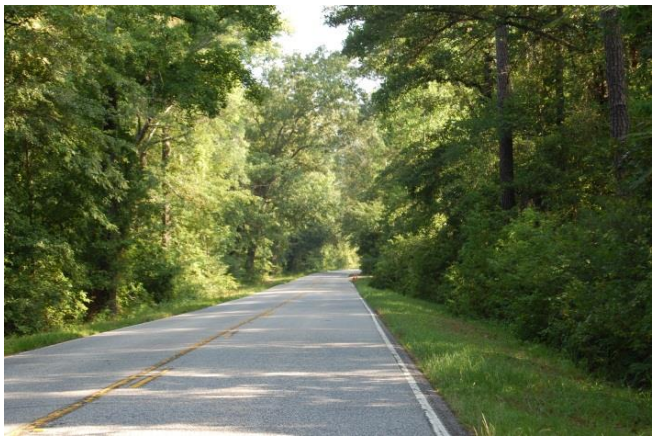
Scenic Quality Section 7: U.S. Highway 278 to Urquhart 230 kV Substation

Figure 4.8-1: Scenic Quality Segments



Graniteville Substations No. 1 and No. 2 to Trolley Line Road

View of Flat Rock Pond from SCE&G R.O.W.



View along Senn Street

Graniteville Substations and SCE&G R.O.W.

View of SCE&G R.O.W. from Trolley Line Road

From Graniteville Substations No. 1 and No. 2, the Lines' route parallels three transmission lines located within the same cleared right-of-way (Graniteville #2-Owens Corning 115 kV Line, Aiken-Graniteville #2 115 kV Line, and the existing Urquhart-Graniteville #2 230 kV Line). The Lines' route traverses one mile of mature pine plantations intermixed with volunteer hardwood species before reaching a bottomland area. The Lines' route crosses approximately 900 feet of delineated wetlands and streams with higher ratios of hardwoods to pines. The Lines then continue 0.2 miles and turns south across Trolley Line Road. The Aiken-Graniteville #2 115 kV Line deviates from the shared right-of-way and turns east down Trolley Line Road.

The majority of land in the immediate vicinity of Graniteville Substations No. 1 and No. 2 is owned by only 5-6 property owners, and each tract consists of hundreds of acres that are being used for timber production. With the exception of Trolley Line Road, which borders this scenic area, Senn Street is the only road through this area and is paralleled by a Southern Railway line. Primary views of the immediate area surrounding Graniteville Substations No. 1 and No. 2 are from Senn Street. Mature canopied hardwoods and pines overhang Senn Street and offer brief views of Flat

Rock Pond, which is a primary contributor to this areas' scenic quality. While a number of existing electric lines and the Graniteville Substations No. 1 and No. 2 are visible for a very short distance along Senn Street, the scenic quality of the area is only minimally affected.

Graniteville Substations No. 1 and No. 2 to Trolley Line Road Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **2**
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. **5**
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. **5**
Color	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**
Influence of adjacent scenery	Adjacent scenery has little influence on overall visual quality. **2**
Scarcity	Distinctive, though somewhat similar to others within the region. **4**
Cultural modifications	Modifications add variety but are somewhat discordant and promote strong disharmony. **-3**

Total Scenic Quality Score: 18

Trolley Line Road to Pine Log Road

Residential subdivision on Pine Log Road

View of SCE&G R.O.W. from U.S. Highway 78

View of commercial corridor along U.S. Highway 78

Typical conditions along Howlandville Road

The Lines' route continues south past Trolley Line Road up a forested ridge before crossing Gregg Highway. The route continues through a scattered mix of immature forests and scrub/shrub cover where it then crosses U.S. Highway 1/78 and, subsequently, a Southern Railway line. U.S. Highway 1/78 is a major artery connecting the cities of Aiken, South Carolina and Augusta, Georgia, along with a number of small towns in-between including Graniteville, SC. This commercial corridor includes a variety of incongruent land uses, such as "big box" retail stores, car dealerships, junkyards, scattered single-family houses, as well as a sand mining and trucking facility. Due to the presence of sandy soils, areas of steep terrain, and the lack of significant vegetative cover, erosion is significant several areas visible from Gregg Highway. While natural erosional patterns can be visually interesting, those present in this area are more likely the consequences of neglected land management.

The Lines' route continues past the sand mine for 0.4 miles and across Augusta Road, and then another 0.3 miles where it reaches SCE&G's Stiefeltown Substation, which is located adjacent to the Lines' right-of-way. At this point the Graniteville-Owens Corning 115 kV Line deviates from

the Lines' route and runs southeast. From the SCE&G substation, the Lines' route continues south through a pure stand of mature planted pines for 0.6 miles where it then crosses Santee Cooper's North Augusta Tap 115 kV line. The Lines' route then passes through approximately one mile of a rural residential area consecutively crossing Howlandville Road, Schley Street, and Legion Road. Once past Legion Road the Lines' route crosses 0.4 miles of young forest land and scrub/shrub land before reaching Hillman Street. The Lines' route then passes through a subdivision that was developed well after the establishment of the Lines' right-of-way.

Much of this area has been fragmented by county roads with moderate densities of residential development and with an occasional commercial highway corridor. In general, this area of the line route lacks many of the landscape and scenic features necessary to classify it as having higher degrees of scenic quality according to the BLM scenic quality criteria.

Trolley Line Road to Pine Log Road Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **2**
Vegetation	Little or no variety or contrast in vegetation. **1**
Water	Absent, or present, but not noticeable. **0**
Color	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **2**
Influence of adjacent scenery	Adjacent scenery moderately enhances overall visual quality. **3**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add variety but are somewhat discordant and promote strong disharmony. **-3**

Total Scenic Quality Score: 6

Pine Log Road to Herndon Dairy Road

View of SCE&G R.O.W. from Glenwood Drive

Residential subdivision on Glenwood Drive

Pasture land on Briar Patch Lane

Typical rural conditions on Briar Patch Lane

After crossing Pine Log Road, the Lines' route continues through 0.6 miles of fragmented pine forests before reaching Glenwood Drive. The Lines' route then continues approximately 1.96 miles through mostly scrub/shrub vegetation and adjacent to a gated, low-density subdivision off Glenwood Drive. The houses are relatively well screened from the line due to the high number of pine trees that were preserved during the subdivision's construction. After crossing Briar Patch Lane, the Lines' route runs adjacent to a cattle/horse farm for 0.28 miles where it then reaches Herndon Dairy Road.

Equestrian type land uses begin to become more apparent in this section of the Lines' route. Many property owners have fenced-in riding areas and pasture lands for the breeding, training, and recreational enjoyment of horses.

Pine Log Road to Herndon Dairy Road Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **2**
Vegetation	Some variety of vegetation, but only one or two major types. **2**
Water	Flowing, or still, but not dominant in the landscape. **3**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery moderately enhances overall visual quality. **2**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**

Total Scenic Quality Score: 11

Herndon Dairy Road to Storm Branch Road

Pasture on SCE&G R.O.W. along Boyd Pond Road

Horse farm on Boyd Pond Road

Horse farm on Boyd Pond Road

Horse farm with Lake Johnsons in the background

The Lines' route continues past Herndon Dairy Road through mature forests for 0.40 miles before running 0.55 miles through a large, low-density, gated subdivision. Most of the lots within the subdivision are large enough to allow for fenced-in pasture land and horse riding areas. The Lines' route then continues for another 0.62 miles before reaching Boyd Pond Road, an area that is characterized by high-quality, large acreage horse farms. The site amenities, construction methods and styles, and maintenance standards are all very similar between the horse farms along Boyd Pond Road and Horse Creek Road, creating a very harmonious landscape composition. In addition, significant portions of the Lines' right-of-way in this line segment is being maintained by the property owners as horse pasture and areas for equestrian sports. Rail fences are common within and crossing the right-of-way, and the color contrast of the dark rails and lush, green grass in the right-of-way provides pleasing views along this portion of the Lines' route. Public roads in this area also offer brief views of a number of large ponds in this area including, Burgess Lake, Lake Johnsons, and Boyd Pond. After crossing Boyd Pond Road, the Lines' route runs through a residential area adjacent to Lake Johnsons before reaching Storm Branch Road.

Herndon Dairy Road to Storm Branch Road Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **2**
Vegetation	Some variety of vegetation, but only one or two major types. **3**
Water	Flowing, or still, but not dominant in the landscape. **3**
Color	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**
Influence of adjacent scenery	Adjacent scenery moderately enhances overall visual quality. **3**
Scarcity	Distinctive, though somewhat similar to others within the region. **3**
Cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. **1**

Total Scenic Quality Score: 18

Storm Branch Road to Pine Log Road

Forest management along Storm Branch Road

Landscape Buffer across the R.O.W. along Bellingham Drive

Tree-lined corridor along Storm Branch Road

Horse farm and pastures along Storm Branch Road

From Storm Branch Road, the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route continues south for 0.2 miles where it then turns and runs in a westerly direction. At this angle point, four additional SCE&G transmission lines converge and run in the Lines' right-of-way to the Urquhart Generating Station, including the Canadys-Urquhart 230 kV Line, the Urquhart-Owens Corning 115 kV Line, the Urquhart-Fairfax 115 kV Line, and the Urquhart-S.R.S. 115 kV Line. The Lines' route traverses managed pine forests and bottomland areas for 0.5 miles where it then crosses Bellingham Drive, which is a road connecting two areas within a residential subdivision. A planned landscape buffer exists on each side of Bellingham Drive at the Lines' crossing point, along with an irrigated community play field within the right-of-way on the east side the road. The Lines' route continues 1.15 miles through forested areas and across another 0.72 miles of pasture land before reaching Pine Log Road.

With exception to the small subdivision, the area surrounding the Lines' route in this route segment is largely undeveloped. Most of the acreage is covered by pine plantations, bottomland,

and scrub/shrub vegetation. A few houses and horse farms are present at the northern beginning point of this segment of the Lines along Storm Branch Road.

Storm Branch Road to Pine Log Road Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **2**
Vegetation	Some variety of vegetation, but only one or two major types. **3**
Water	Flowing, or still, but not dominant in the landscape. **2**
Color	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**
Influence of adjacent scenery	Adjacent scenery moderately enhances overall visual quality. **3**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add little or no visual variety to the area, and introduce some discordant elements. **-2**

Total Scenic Quality Score: 12

Pine Log Road to U.S. Highway 278

Forest management on Pine Log Road

SCE&G R.O.W. looking east from Pine Log Road

Farmland Field on Hammond Road

Conditions along Old Ferry Road

Continuing past Pine Log Road, the Lines' route passes through 1.05 miles of actively managed pine plantation forests before reaching Beech Island Avenue. The Lines' route then continues for another 0.45 miles where it turns to the southwest across Scarborough Road. The route then crosses over a pond located in the SCE&G right-of-way and then traverses 0.76 miles of pine and scrub/shrub forests before taking a slight turn to the west, running another 0.14 miles where it reaches U.S. Highway 278.

While the scenic quality rating of this area of the Lines' route is not particularly higher than in other areas based on the BLM metric, several landscape characteristics in this area are unique to the Lines' route. This is the first and only instance in which open land is used for agricultural crop production, which is likely due to the relatively flat terrain. Due to the proximity to the Beech Island community, the density of residential development is increased as compared to the previous section of the Lines' route (Storm Branch Road to Pine Log Road). In addition, residential areas have retained a rural quality by utilizing a development pattern that is primarily contained to the road corridors.

Pine Log Road to U.S. Highway 278 Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. **4**
Water	Absent, or present, but not noticeable **1**
Color	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**
Influence of adjacent scenery	Adjacent scenery has little influence on overall visual quality. **1**
Scarcity	Distinctive, though somewhat similar to others within the region. **3**
Cultural modifications	Modifications add little or no visual variety to the area, and introduce some discordant elements. **-2**

Total Scenic Quality Score: 11

U.S. Highway 278 to Urquhart 230 kV Substation

View of Urquhart Generating Station from Cary Drive

Commercial corridor on Sand Bar Ferry Road

View along U.S. Highway 278

View of Savannah River from Sand Bar Ferry Road Bridge

From U.S. Highway 278, motorists are unable to see down either side of the SCE&G right-of-way due to elevation change and embankments on either side of the road. Once across U.S. Highway 278, the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route continues west for 0.11 miles and then turns southwest for 0.16 and crosses Swamp Road. The Lines' route then continues for 0.18 miles adjacent to a small campground before reaching Sand Bar Ferry Road. The Lines' route continues 0.2 miles before crossing a dirt road, Old Ferry Road. The right-of-way in-between Swamp Road and Old Ferry Road is currently being used for commercial construction laydown. Continuing southwest for another 0.1 miles, the Lines' route then turns northwest and runs for 0.23 miles where it then crosses Cary Drive, which displays an open view of the Urquhart Generating Station that is seen along the SCE&G right-of-way. The Lines' route then runs 0.46 miles before the Urquhart-Graniteville #2 230 kV Line terminates at the Urquhart 230 kV Substation.

Along this line section, the Graniteville-South Augusta 230 kV Tie Line deviates from the existing right-of-way approximately 2,000 feet east of the Urquhart 230 kV Substation. The Line will run approximately 0.92 miles on this new line segment to the north of the Urquhart Generating

Station and will terminate on a transmission line structure adjacent to the Savannah River. The visual character along this segment is very highly modified be existing substations, multiple transmission lines and the Urquhart Generating Station and associated facilities.

The general area traversed by the segment of existing SCE&G right-of-way in this visual quality segment is characterized by the Beech Island community and the Savannah River, which is the South Carolina/Georgia state line. While the Urquhart Generating Station is the largest facility and occupies the largest land parcel in this area, sufficient vegetative screening and distance have somewhat mitigated its potential negative visual effects from the surrounding area. However, the area surrounding the generating station is fragmented by highways and transmission line rights-of-way, most notably that of the Lines' route that contains 6 individual lines and is approximately 340' in width. Based on visual field observations, the Beech Island community also seems to lack that common centralizing element that defines or characterizes a place. While the Savannah River is the most dominant landscape element, the Beech Island community appears to have not taken advantage of the river as a cultural amenity.

U.S. Highway 278 to Urquhart 230 kV Substation Scenic Quality Rating Table

Key factors	Rating Criteria and Score
Landform	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation	Some variety of vegetation, but only one or two major types. **1**
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. **5**
Color	Subtle color variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery moderately enhances overall visual quality. **3**
Scarcity	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add variety but are somewhat discordant and promote strong disharmony. **-4**

Total Scenic Quality Score: 8

Summary

Application of the BLM methodology for assessing scenic quality along the route of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines reveals the majority of the Lines' route (four scenic quality sections comprising approximately 66% of the Lines' total length) will be located within low scenic quality areas (total scenic quality scores of 11 or less). Three scenic quality sections (approximately 34% of the Lines' total length) are located in areas considered to be of

moderate scenic quality (total scenic quality score of 12-18). This evaluation does not necessarily indicate unattractiveness of the majority of the area; rather, scores indicating low scenic quality represent a metric that correctly indicates lack of topographic high points that would offer interesting elevation relief and long views and vistas, lack of landscape diversity (water, texture, color), lack of adjacent scenic features visible from the immediate area of the Lines' route, and the degree to which the Lines pass through areas that are highly modified by various types of development and infrastructure. Total Scenic Quality Scores are also indicative of visual sensitivity present in defined areas with regard to the addition of transmission lines through the areas. Generally, high Total Scenic Quality Scores are indicative of areas where the appearance of new transmission lines would be more incongruent than would they be in areas where Total Scenic Quality Scores are low.

5.0 Consequences of the Proposed Action

This chapter describes short- and long-term effects to environmental resources, land use, cultural resources and scenic resources that will occur as a result of construction and operation of the Graniteville-South Augusta 230 kV Tie Line and Urquhart-Graniteville #2 230 kV Line. An array of environmental, cultural resource, land use and scenic data were collected from various local, state and federal agencies and developed from field studies to support the findings presented in this chapter. The data were organized into GIS data layers and mapped for the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' data collection and analysis area, which includes the geographic area extending outward as far as 1.25 miles on each side of the centerline of the future Lines for the analysis of cultural resources and 1.0 mile for analysis of rare, threatened, endangered and protected species. The potential effects to other resources were analyzed for an area extending outward 1,000 feet from the future lines and/or the area within the existing or new SCE&G right-of-way in which the Lines will be located.

As discussed in Section 2.1, except for a 0.92 mile route segment on the Urquhart Generating Station site where approximately 7.26 acres of new right-of-way will be required to augment existing right-of-way, the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built entirely within existing, cleared SCE&G right-of-way alongside other existing SCE&G transmission lines.

5.1 Land Use

SCE&G collected and mapped existing and future land use data in the immediate vicinity of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route (*Figure 5.1-A*). Typically, the most significant effect to land use resulting from construction of electrical transmission lines is the permanent restriction on building erection, timber production and other uses within the right-of-way that could interfere with the reliable, safe operation of the lines. With regard to the approximately 17.2 miles of the Lines that will be built in the existing SCE&G rights-of-way between the Urquhart and Graniteville Substations, those restrictions have been in force and effect for decades. Similarly, the approximately 0.92 mile segment of the line route that will reside in a right-of-way corridor on the Urquhart Generation Station site will not affect the current land use, which is electric power generation; therefore, the Lines will have no effects on existing land use.

Permitted uses in the right-of-way include pastures, crop production, roads, driveways, parking lots, walking trails and many other uses that will not interfere with the safe, reliable operation of the Lines. Chart 5.1-1 lists the acreages of current land uses within the right-of-way of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines.

Chart 5.1-1 Affected Land Use in the Right-of-Way*

Land Use	Acres
Farmland (cropland, pastures and grassland/hay fields)	40.4
Electric Power Generation	5.3
Gas Pipeline Right-of-Way	0.5
Railroad Right-of-Way	0.8
Road Right-of-Way	5.9
SCE&G Property	1.7
Water (River/Lake/Pond)	0.8
No Identifiable Land Use (other than routine right-of-way management)	168.4

* *Chart data are based only on the acreages within the proposed right-of-way on the Urquhart Generating Station site and 100' wide linear zone (50' on each side of the proposed Lines) within the existing, wider SCE&G right-of-way.*

The locations of all occupied buildings within 1,000 feet of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route were digitized from aerial photography and field studies and compiled in a GIS data base (*Figure 5.1-B*). Chart 5.1-2 displays the quantity of all occupied buildings (residential, commercial, industrial and institutional) that are present within various distance ranges of the future Lines' proposed centerline.

Chart 5.1-2 Proximity of Occupied Buildings

Proximity of Buildings to the Lines	Quantity
Number of occupied buildings within 200' of the proposed Lines	64
Number of occupied buildings between 200' and 500' of the proposed Lines	229
Number of occupied buildings between 500' and 1000' of the proposed Lines	462
Total	**755**

The Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will have no effect on existing, occupied buildings or their current uses.

5.2 Soils

Prudent construction and erosion-control measures will be used to avoid potential minor, short-term impacts, and soils will be stabilized, as necessary, with vegetation as construction progresses over the length of the Urquhart-Graniteville Lines' right-of-way. No earth grading activities are anticipated due to the utilization of existing right-of-way and access roads. SCE&G will comply with the South Carolina Department of Health and Environmental Control Regulation 72-300 through 72-316 (June 28, 2002) with all line construction operations and will employ seeding and erosion and sediment control measures that meet or exceed local, state, and federal requirements.

5.3 Prime Farmland and Farmland of Statewide Importance

Prime farmland is comprised of soils (and slopes) that have the best combination of physical

and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses. The land could be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water. Prime farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when managed according to sound farming methods. In general, prime farmlands have an adequate and dependable moisture supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. Prime farmland soils are permeable to water and air and are not excessively erodible or saturated with water for long periods of time. Typically, they do not flood during the growing season or they are protected from flooding.

Farmlands of Statewide Importance are soils that are, in addition to soils classified as prime farmland, important for the production of food, feed, forage, fiber, and oil seed crops. Generally, farmlands of statewide importance include soils that are nearly prime farmland and that economically produce high yields of crops when managed according to acceptable farming methods. Some may produce crop yields as high as prime farmlands if conditions are favorable. Chart 5.3-1 lists the acreage of Prime Farmland and Farmland of Statewide Importance that occur in the existing and proposed new right-of-way within which the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line will be built (*Figure 5.3*).

Chart 5.3-1 Affected Prime Farmland Soils and Farmland Soils of Statewide Importance

Farmland Classification	Acres*
Prime Farmland	37.6
Farmland of Statewide Importance	38.4
Prime Farmland if drained and either protected from flooding or not frequently flooded during the growing season	0.6
Not Prime Farmland or Farmland of Statewide Importance	147.3

* *Chart data are based only on the acreages within the proposed new right-of-way and 100' wide linear zone (50' on each side of the proposed Lines) within the existing, wider SCE&G right-of-way.*

Disturbance to prime farmland soils and soils associated with farmland of statewide importance that will result from construction of the Lines will be de minimis since no new access roads are likely to be required and no grading will occur that would disturb the "plow layer." Assuming new structures will be installed at an average spacing of 600 feet over the approximate 18.1 mile route, the number of new structures placed in prime farmland soils and soils of statewide importance will be approximately 52 over the portion of the Line's route where prime farmland soils and soils of statewide importance are present. Assuming 6 feet diameter holes will be augured to install these structures, the total area of impact to prime farmland soils, soils of statewide importance and soils that could be prime farmland if either drained or protected from flooding resulting from construction of the Lines will be approximately 1,470 square feet.

5.4 Wetlands and Stream Buffers

Wetlands are defined by 33 CFR Part 328 and protected by Section 404 / 401 of the U.S. Clean Water Act. Based on wetland surveys and delineations conducted in October 2014 and February 2017 by Palmetto Environmental Consulting, Inc. ("PEC"), approximately 12.8 acres of wetlands and approximately 1.7 acres of open water reside in the existing and proposed right-of-way within which the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line will be built. Also, approximately 2,010 linear feet of stream channels are present in the right-of-way (*Figure 5.4-A* and *Figure 5.4-B; Appendix B*).

No structures will be placed in open water, streams or stream buffer zones, and no navigable waters will be crossed by the Lines. To the extent practical, SCE&G will design the Lines to span wetlands; however, in the unlikely event a structure is required within a wetland, access to it for construction purposes will be accomplished on fiberglass or wooden mats, and no permanent roads will be constructed in the wetlands. Because no filling or clearing will occur in wetlands or stream buffer zones, no wetland or stream impacts will result from construction and operation of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines.

Chart 5.4-1 lists all hydrological resources within the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' right-of-way.

Chart 5.4-1 Wetlands and Stream Buffers within the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line Right-Of-Way*

Hydrological Resource Type	Acres
Acres of river, lake or pond in the right-of-way	1.7
Acres of wetland in the right-of-way	12.8
Acres of wetland in the right-of-way within which vegetative clearing will be required	0
Acres of upland within the right-of-way within 100' of any stream, river, lake, pond, or wetland	25.1
Acres of upland within the right-of-way within 100' of any stream, river, lake, pond or wetland that will require vegetative clearing	0

* *The acreages in Chart 5.4-1 are calculated for the entire width of the existing right-of-way rather than the 100' wide linear zone within which the Lines will be constructed. The acreages also include hydrological resources in the proposed new right-of-way on the Urquhart Generating Station site.*

PEC requested and received from the United States Army Corps of Engineers ("USACE") a "Preliminary Jurisdictional Determination" that confirmed PEC's October 2014 findings regarding the locations and quantities of wetlands, waters (perennial streams), and open waters in the existing right-of-way within which the Lines will be built (Section 4.3; *Figures 5.4-A* and *B*; *Appendix B*). Also, in February 2017 PEC completed waters and wetlands delineation along the approximately 0.92 mile segment of right-of-way that resides on the Urquhart Generation Station site and has requested from the USACE a Preliminary Jurisdictional Determination for that segment of the Line

route that included 0.1 acre of wetlands and 100 linear feet of stream bank at the Savannah River. As of the date of this report, the USACE has not issued a Preliminary Jurisdictional Determination in response to the latest request.

Because of the measures SCE&G takes to protect wetlands, stream buffer zones, streams and open waters during transmission line construction, no short- or long-term impacts to waters of the United States will occur. If, in the unlikely event a structure is required in a delineated wetland, SCE&G will construct the Lines under the provisions of Nationwide Permit No. 12 ("NWP 12") after filing a preconstruction notification ("PCN") with the USACE, which will define construction measures that will be taken to ensure compliance with NWP 12 requirements.

5.5 Flood-Prone Areas

SCE&G obtained the Federal Emergency Management Agency National Flood Insurance Program maps for Aiken County, South Carolina, and added the data to the GIS database (*Figure 5.5*). Chart 5.5-1 summarizes the flood zones that will be within the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line right-of-way.

Chart 5.5-1 Flood Zones in the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line Right-of-Way*

Flood Zone Classification	Acres
Zone AE - Floodway	10.0
Zone AE - 100-Year Flood Plain (Base Flood Elevations Determined)	9.7
Zone X - 500-Year Flood Plain; 100-Year Flood Plain (Less Than 1' Depth)	1.7
Zone X - Areas Determined to be Outside 500-Year Flood Plain	202.4

* *Chart data are based on the acreages within the proposed new right-of-way and the 100' wide linear zone (50' on each side of the proposed Lines) within the existing, wider SCE&G right-of-way.*

The U.S. Department of Agriculture, Rural Utility Service Bulletin 1794A-600, states the following in Section 3.2 regarding the placement of electrical transmission line structures in floodplains: *"Floodplain management requires Federal agencies to avoid actions, to the extent practicable, which will result in the location of facilities in floodplains and/or affect floodplain values. Facilities located in a floodplain may be damaged seriously by floodwaters or may change the flood handling capability of the floodplain or the pattern or magnitude of the flood flow. Normally single pole structures and buried cable should be considered to have no significant impact on floodplain values."* The single pole structures that will be used for the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will have no measurable effect on floodplain values where structures, if any, are required in floodplains, and the reliability of the Lines will not be affected by the portions of the Lines that will cross designated floodplain zones.

5.6 Land Cover

An inventory of land cover in the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line right-of-way was made through the use of Landsat Satellite imagery, 2011 U.S. Department of Agriculture aerial photography, 2015 Google Earth aerial photography, field inspections and results of the biological investigations within the right-of-way. ArcGIS, a geospatial data authoring system, was used to aggregate the various land cover into distinct classifications (*Figure 5.6*). Chart 5.6-1 lists the quantity and classifications of land cover in the Lines' right-of-way.[8]

Chart 5.6-1 Affected Land Cover in the Right-of-Way*

Land Cover Classification	Acres in the Right-of-Way
Barren	9.5
Bottomland/Floodplain/Hardwood Forest	0.0
Cropland	12.9
Grass/Pasture	156.4
Mixed Hardwood/Pine Forest	1.2
Pine Forest	0.5
Scrub/Shrub	21.1
Urban/Built-up	14.9
Water	0.8
Wetland	6.4

* *Chart data are based on the acreages within the proposed new right-of-way and the 100' wide linear zone (50' on each side of the proposed Lines) within the existing, wider SCE&G right-of-way.*

Since the existing right-of-way within which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built is cleared, no additional land clearing in it is anticipated. The proposed new right-of-way that resides on the Urquhart Generating Station site has two isolated stands of trees that will require clearing (approximately 1.7 acres). The predominant tree species removed will be loblolly pine, various oak species, China berry, and wild cherry.

5.7 Wildlife

An issue associated with large raptors is their vulnerability to power line electrocution. Their large size, wingspan, and perching make them susceptible to electrocution on certain transmission line designs. Transmission line structures with inadequate spacing between phases (i.e., less than 60 inches of separation between conductors and/or grounded hardware) can cause raptor electrocutions. With this in mind, the USFWS has recommended, under authority of the Migratory Bird Treaty Act and

[8] Because the existing right-of-way that the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built within contains multiple transmission lines, the land cover effects are calculated for only the 100' wide partial width of the right-of-way that constitutes the "zone of construction."

Bald and Golden Eagle Protection Act, that (1) all new transmission structures be equipped with design features that prevent raptor electrocutions. Such features typically include designs that make the distance between phase conductors greater than the wingspread of the bird that is landing, perching, or taking off; and (2) increase the distance between grounded hardware (e.g., overhead ground-wires) and an energized conductor to more than the largest bird's wingspread or the distance from the tip of the bill to the tip of the tail, whichever is greater. The 230 kV structures that will be used on Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line will be "raptor safe" and will meet the guidelines recommended in Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006 (Avian Power Line Interaction Committee 2006); therefore, raptor electrocutions are not anticipated as a result of constructing the Lines.

Construction of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will have no measurable effects on wildlife or wildlife habitat, adverse or otherwise, since the Lines will be built in existing, cleared right-of-way and on the Urquhart Generating Station site where only a minor amount to clearing will be required in isolated stands of trees.

5.8 Rare, Threatened, or Endangered Resources

As discussed in Section 4.6, of this report, PEC conducted a protected species literature and records search in September 2014 and February 2017 to determine the presence of known occurrences of federally- and state-listed animal and plant species on or within a one mile of the right-of-way within which the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line will be located. The literature and records searches revealed four known occurrences of federally endangered red-cockaded woodpecker (*PIcoides borealis*), all last observed between 1975 and 1984, within one mile of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route; however, during a 1987 protected species investigation, it was determined that these four occurrences have been extirpated. Although no listed species are documented to exist within future Lines' right-of-way, the record searches revealed that the Lines' route is within one mile of recorded occurrences of the following listed plant species:

- One occurrence of bog spicebush (last observed in 1995), which is listed by the South Carolina Department of Natural Resources (SCDNR) as S3;
- A population of sweet pitcher-plant (last observed 1995); SCDNR listed as S3/S4;
- One occurrence of piedmont water-milfoil (last observed in 1983); SCDNR listed as S2; and
- One occurrence of red standing-cypress (last observed in 1981); SCDNR listed as S2.

SCE&G engaged PEC to inspect the right-of-way to verify the presence or absence of state- and/or federal-listed threatened and endangered species, and none were found during an October

2014 field investigation along the existing right-of-way, which was confirmed during a February 2017 field investigation when PEC reexamined the existing right-of-way. Likewise, no listed species were found by PEC during a February 2017 field investigation along the approximately 0.92 mile segment of the Graniteville-South Augusta 230 kV Tie Line that will be constructed on the Urquhart Generating Station site. However, potential habitat (i.e., soil, water, vegetative, sun/shade exposure and slope aspect conditions that would potentially support specific plant or animal species) that would likely support 32 listed species (6 animal species and 26 plant species) was found by PEC along the existing right-of-way. PEC reported that potential habitat for 22 listed species (2 animal species and 20 plant species) is present along the proposed new right-of-way segment that will reside on the Urquhart Generating Station site.

Due to the absence of protected species in the existing and proposed right-of-way and, further, due to no changes in potential habitat for listed species except for a minor amount of vegetative clearing on the Urquhart Generating Station site, no adverse effects to protected species are anticipated as a result of construction and operation of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines.

The results of the protected species records searches and field investigations are summarized in PEC's October 2014 report entitled *"Federally-Listed Threatened and Endangered Species/State Rare, Threatened, and Endangered Species Assessment and Jurisdictional Waters/Wetlands Assessment (for the) Graniteville-South Augusta / Urquhart-Graniteville #2 Lines, Aiken County, South Carolina"* and in PEC's letter report entitled *"Letter of Findings for Graniteville-South Augusta 230kV Tie Line Update of Protected Species Assessment for Urquhart-Graniteville #2 230kV Line"* dated February 21, 2017 (*Appendix B*).

5.9 Cultural Resources

As discussed in Section 4.7, SCE&G engaged Brockington and Associates, Inc. ("Brockington") to conduct background research to identify all previously recorded archaeological and historic resources within in 1.25 miles of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route. Moreover, the scope of Brockington's work included a windshield reconnaissance survey to identify any previously unrecorded individual architectural, multi-property and/or district architectural resources within 1.25 miles of the Lines' route that appear potentially eligible for listing in the National Register of Historic Places ("NRHP") (*Figure 5.9*). SCE&G also engaged Brockington to conduct a Phase I archaeological investigation in the existing right-of-way within which the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be built. The purpose of the Phase I investigation was twofold. First, it was to conduct extensive background research to determine the

presence of previously recorded archaeological sites within 1.25 miles of the proposed Lines' route and confirm their current NRHP eligibility status. The second purpose was to conduct a comprehensive Phase I archaeological investigation in the existing right-of-way[9] within which the Lines' will be built to determine the presence, if any, of previously unrecorded archaeological resources and recommend the NRHP status of any discovered. The Phase I investigation was conducted in conformity to the standards set out in the S*outh Carolina Standards and Guidelines for Archaeological Investigations* and in accordance with *Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 470).*

Before commencing the Phase I archaeological investigation, Brockington conducted background research that included a review of ArchSite program data maintained by the South Carolina Institute of Archaeology and Anthropology ("SCIAA) and the cultural resource data maintained on Georgia's Natural, Archaeological, and Historic Resources GIS ("GNAHRGIS"). These online Geographic Information Systems enable researchers to quickly determine if cultural resources surveys have been conducted in specific areas and whether or not any cultural resources and/or historic properties have been previously recorded in the specified area. Brockington conducted additional research at the state site files office at the SCIAA and the South Carolina Department of Archives and History (SCDAH). Chart 5.9-1 include a listing and description of the nine sites (eight in South Carolina and one in Georgia) within 1.25 miles of the Lines' route that Brockington identified while conducting background research.

Chart 5.9-1 Previously Recorded Archaeological Sites within 1.25 Miles of the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV LineRoute

Site Number	Site Description	Cultural Affiliation	NRHP Eligibility
38AK0004	Historic Fort	17th-18th century	Listed on the NRHP
38AK0005	Historic Fort	17th-18th century	Listed on the NRHP
38AK0032	Prehistoric Mound	Late Archaic	Not Assessed
38AK0043	Unknown	Late Woodland	Not Assessed
38AK0047	Historic Plantation	18th-19th century	Listed on the NRHP
38AK0052	Artifact scatter	Unknown Prehistoric/20th century	Potentially Eligible for Listing on the NRHP
38AK0786	Railroad grade	19th-20th century	Potentially Eligible for Listing on the NRHP
38AK1069	Historic Artifact Scatter	20th century	Recommended Not Eligible
9RI1030	Kathryn S. Vessel	20th century	Not Assessed *(site located in Georgia)*

[9] The Phase I archaeological investigation was limited to a 100' wide linear zone (50' on each side of the propose Lines' position within the wider SCE&G right-of-way). This linear zone is inclusive of the zone within the existing right-of-way that will be used for construction activities.

Brockington determined that none of the previously recorded nine archaeological sites within 1.25 miles of the Lines' route will be directly or indirectly affected by construction of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines because none are located within the existing SCE&G right-of-way.

After completing the background research, Brockington conducted the Phase I archaeological investigation in the existing right-of-way within which the Lines will be located from April 28 to May 9, 2014. The investigation included 837 shovel test excavations that led to the identification of three previously unrecorded archaeological sites (38AK1089, 38AK1090, and 38AK1091) and two isolated finds (Isolate 1 and Isolate 2) within 50 feet of the proposed centerline of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines. Chart 5.9-2 provides information about the previously unrecorded archaeological sites and isolated finds.

Chart 5.9-2 Archaeological Sites and Isolated Finds within 50 Feet of the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line Centerline

Site Number	Site Description	Cultural Affiliation	NRHP Eligibility
38AK1089	Lithic scatter	Indeterminate Prehistoric	Recommended Not Eligible for listing on the NRHP
38AK1090	Historic artifact scatter	19-20th Century	Recommended Not Eligible for listing on the NRHP
38AK1091	Historic artifact scatter	19-20th Century	Recommended Not Eligible for listing on the NRHP
Isolate 1	Lithic and ceramic scatter	Paleoindian/Indeterminate Prehistoric	Recommended Not Eligible for listing on the NRHP
Isolate 2	Lithic scatter	Indeterminate Prehistoric	Recommended Not Eligible for listing on the NRHP

In summary, none of the nine previously recorded archaeological sites within 1.25 miles of the Lines' route will be affected by the project. The three archaeological sites discovered during the 2014 Phase I archaeological investigation in the existing right-of-way, according to Brockington, display very low artifact density and lack diagnostic artifacts and are thus recommended not eligible for listing on the NRHP. Similarly, according to Brockington, isolated finds are generally not eligible for the NRHP, and the context of the two isolated finds within 50 feet of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines centerline in the existing right-of-way do not support an argument for recommending them otherwise. Brockington, therefore, determined that the project will have no adverse effects on archaeological resources in the existing right-of-way between Urquhart 230 kV Substation and Graniteville Substations No. 1 and No. 2. Brockington submitted the findings of Phase I archaeological investigation to the State Historic Preservation Office ("SHPO") in a report entitled *Phase I Archaeological Resources Survey of the 17.6 Mile Urquhart-Graniteville Transmission Line Corridor* dated September 2014 and received a concurrence letter from them dated November 17, 2014 that stated, *"Our office accepts the final report, and no further documentation is necessary for this project"* (*Appendix B*).

Subsequent to the 2014 Phase I archaeological investigation, SCE&G determined it would be necessary to place the Graniteville-South Augusta 230/115 kV Tie Lines on a combination of existing and new right-of-way that bypasses the Urquhart Generating Station and Urquhart 230 kV Substation. Consequently, an approximately 0.92 mile route segment was developed that will reside entirely on the Urquhart Generating Station site and bypass the generating station on its north side before connecting to the existing SCE&G right-of-way previously investigated by Brockington in 2014 that runs between the Urquhart 230 kV Substation and Graniteville Substations No. 1 and No. 2. In February 2017, SCE&G engaged Brockington to conduct a Phase I archaeological investigation within the proposed 0.92 mile segment of right-of-way. After conducting comprehensive shovel test excavations throughout the proposed 0.92 mile segment on February 16 and 17, 2017, Brockington concluded that no cultural materials are present in the 100' wide, 0.92 mile corridor; therefore, construction of the Graniteville-South Augusta 230/115 kV Tie Lines in the proposed right-of-way will have no adverse effects to archaeological resources. Brockington reported the findings of this investigation in a report dated February 27, 2017, entitled *Archaeological Survey of the Graniteville-South Augusta 230 kV Tie Line at the Urquhart Generating Station Site, Aiken County, South Carolina* (*Appendix C*). This report was submitted to the SHPO as an addendum report to the one previously filed for the project in 2014, and the SHPO in a letter to Brockington dated March 28, 2017 accepted it as final.

Based on the findings of Brockington's two Phase I archaeological investigations, inadvertent discoveries of cultural materials during construction are unlikely; however, such discoveries can never be entirely ruled out. For that reason, all construction supervision will be given "cultural materials recognition" training designed to facilitate immediate recognition of possible cultural materials that may be unearthed during construction of the Lines (primarily when auguring holes to set new structures). The supervisors will be instructed to stop construction activities in any specific area where unearthed material appears to be cultural material and to contact a designated person who will arrange an inspection of the suspected cultural material by a qualified expert. Construction shall not resume in such areas until the suspected cultural material is determined to be insignificant or SCE&G and the SHPO have agreed on an action plan that will allow construction to resume.

Given the systematic approach SCE&G has executed to date and will exercise during construction of the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line to identify and protect cultural resources, no adverse impacts are anticipated.

With regard to architectural properties and historic districts (Section 4.7), Brockington recommended that a visual effects analysis be conducted to determine whether or not construction

of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will result in adverse effects to viewsheds of any NRHP listed and NRHP eligible resources (a total of 18 resources, all in South Carolina, previously identified by Brockington). Pursuant to this recommendation, U.C. Synergetic ("UCS"), working closely with Brockington on SCE&G's behalf, conducted a viewshed analysis to determine specific locations within 1.25 miles of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines' route where views of the future Lines may be possible. The analysis, which is described in a report prepared by UCS entitled *Historic Structures Visual Impact Assessment Report for the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines* (*Appendix D*), was based on conservative assumptions regarding locations and heights of the new 230 kV transmission line structures that will be utilized on the Lines. Computer modeling was completed based on the top elevation of each new line structure, taking into consideration topography and vegetation. This exercise yielded mapping for each of the NRHP listed and NRHP eligible resources (a total of 18 resources) that indicated the probability, or lack thereof, that views of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be possible from the individual resources. Following the computerized view probability analysis, UCS landscape architects visited each of the eighteen resources that were analyzed in the viewshed analysis to confirm the accuracy of the predicted probability. Of the eighteen resources assessed, only one NHRP listed resource and two NRHP eligible resources will have potential views of the future Graniteville-South Augusta / Urquhart-Graniteville #2 Lines. These three resources are identified in Chart 5.9-1 along with each resource's NRHP classification and a brief description of the visual effects that will result from construction of the Lines.

Chart 5.9-1 Findings of the Viewshed Analysis from Historic Resources

Resource	NRHP Classification	Distance from the Lines' Route	Predicted Visual Effect of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines
Ws05 (Hickman Mill)	Eligible for Listing on the NRHP	1.14 Miles	Digital modeling shows the potential for views of the line route to the north from the fourth story window elevation located on the northeast corner of the building, which was estimated to be 40' above the ground. However, based on the architecture and staggering of the windows on the northeast corner of the building, the windows appear to be associated with an internal staircase. Because of the distance of the view to the Lines and the window's association with stairs rather than interior floor spaces, the change in view conditions from the resource compared to current conditions in the direction of the existing transmission lines will be only slightly recognizable.
Seaboard Coast Line Railroad Bridge (0278)	Eligible for Listing on the NRHP	0.08 Miles	Though visible from the railroad bridge, which is inaccessible to the public, the addition of the Lines will not significantly alter existing view conditions from the resource due to scattered foreground screening and the existing view conditions that are currently highly modified by the Urquhart Generating Station, transmission lines and electrical substations.
Oakland Plantation	Listed on the NRHP	0.82 Miles	No views are expected from the yard area. Views from the second story of the plantation house, if any, will be heavily filtered by the tree canopies in the yard area and are not expected to be evident to the casual viewer within the house due to the partial screening effects of foreground tree canopies and the distance to the Lines (just under one mile).

The one NRHP listed resource and two NRHP eligible resources will not be adversely affected by views of the future Graniteville-South Augusta / Urquhart-Graniteville #2 Lines for the following reasons:

1. Views of the future Lines will be only slightly different from current views of multiple SCE&G transmission lines, including the Urquhart-Graniteville 115 kV line that will removed and replaced by the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines. The visual modification resulting from removing existing H-frame transmission line structures and adding new single-pole structures will be negligible.
2. Due to foreground vegetative screening, the resources will only have very slight views of the future Lines that will not likely be recognized by casual viewers.
3. Distance to the Lines, especially with respect to Hickman Mill and Oakland Plantation.
4. With regard to the Seaboard Coast Line Railroad Bridge, the existing landscape context, which is significantly modified by views of the Urquhart Generating Station, existing transmission lines and electrical substations, will mitigate recognizable changes in view conditions resulting from the addition of the Lines.

5.10 Visual Resources

The visual implications of transmission lines are influenced by several factors. These include the distance from the viewer, the number of structures viewed, whether visible structures are seen against backdrops (vegetation, terrain, man-made elements) or silhouetted against the skyline, the extent to which foreground and mid-ground elements will provide screening, the amount of vegetative modification which contrasts with surrounding landscapes, and the overall scenic condition (landscape content or context) of the area in which the facility is seen. The potential visual implications of the future Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line were carefully evaluated, which included field studies to determine where the future Lines may be visible from public roads (*Figure 5.10*). The Lines will have very low overall visual effects for the following four primary reasons:

1. The Lines will be built within an existing SCE&G right-of-way and on the Urquhart Generating Station site and will, therefore, not pose any significant visual modifications resulting from right-of-way clearing;
2. The Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line will replace an existing 115 kV line that utilizes wooden H-Frame structures;

3. The Lines will share an existing SCE&G right-of-way with multiple other existing SCE&G transmission lines for approximately 17.2 miles of their total 18.1 mile length; and,

4. Significant portions of the Lines' route will traverse undeveloped areas where exiting trees on each side of the right-of-way will provide significant screening.

5.11 Population

Population distribution and density was modeled as a GIS data layer along the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line route based on Year 2010 Census data (*Figure 5.11*). The analysis of the census data provides insight into the Lines' route regarding population center avoidance. Virtually all of the future Lines' length (97.79%) will reside in areas where the acres-per-person ratio is greater than one acre per person. Over half of the Lines' route resides in areas where the acres-per-person ratio is greater than four acres per person, and almost a third of the Lines will be in areas where the acres-per-person ratio is greater than ten acres per person.

Chart 5.11-1 displays incremental lengths of the future Lines that will pass through various population density zones.

Chart 5.11-1: Population Density along the Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line Route

Population Density Area (Acres per person)	Lines' Route Length in the Population Density Zone (Approximate Miles)
< 0.25 Acres per Person	0.0
0.251 – 0.5 Acres per Person	0.1
0.51 - 1 Acres per Person	0.3
1.1 - 2 Acres per Person	2.8
2.1 - 4 Acres per Person	4.4
4.1 - 10 Acres per Person	4.6
> 10 Acres per Person	5.9

5.12 Aviation

Federal Regulations, Title 14-Chapter 1-Subchapter E-Part 77 (Safe, Efficient Use, and Preservation of the Navigable Airspace) establishes standards for protecting navigable airspace and sets forth requirements for Federal Aviation Administration ("FAA") notification of proposed construction that could potentially affect the navigable airspace. Specifically, the notification "triggers" set out in Part 77 that are, or possibly could be, applicable to construction of transmission lines include the following (underlining is added for emphasis):

1) If requested by the FAA, or if any of the following types of construction or alteration are proposed, a notice must be filed with the FAA:
   a) Any construction or alteration that is more than 200 feet above ground line at its site.
   b) Any construction or alteration that exceeds an imaginary surface extending outward and upward from the aviation facility at any of the following imaginary surface slopes:
      i) 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of each public use airport listed in the Airport/Facility Directory with its longest runway more than 3,200 feet in actual length, excluding heliports.
      ii) 50 to 1 for a horizontal distance of 10,000 feet from the nearest point of the nearest runway of each public use airport listed in the Airport/Facility Directory with its longest runway no more than 3,200 feet in actual length, excluding heliports.
      iii) 25 to 1 for a horizontal distance of 5,000 feet from the nearest point of the nearest landing and takeoff area of each heliport.

With these FAA notification triggers in mind, SCE&G identified the following two aviation facilities in the region surrounding the route of the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines: Augusta Regional Airport and Harmon Airport.

Paragraph (i), above, applies to Augusta Regional Airport, which is a public airport with two runways that exceed 3,200 feet in length. Because no structures utilized on the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will be 200 feet or greater above ground line and because the nearest point on the runways to the nearest point on the Lines exceeds 20,000 feet, this notification trigger is not applicable to the Lines.

Paragraph (ii), above, is technically not applicable to Harmon Airport because it is a private rather than public airport. Its runway is less than 3,200 feet in length, and the nearest point on the runway to the nearest point to the future Lines is approximately 8,700 feet. Nevertheless, SCE&G modelled the imaginary 50:1 slope surfaces extending outward 10,000 feet from the Harmon Airport and determined that no structure on the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines will reach the 50:1 imaginary surface slope surrounding the airport's runway (*Figure 5.12*).

For these reasons, SCE&G has determined that FAA notification will not likely be required as a result of constructing the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines. Nevertheless, upon completion of final transmission line engineering, SCE&G may submit a FAA Form 7460-1 to the FAA for selected transmission line structures to confirm that none will affect navigable airspace.

5.13 Noise, Radio, and Television Interference

When a substation or transmission line is in operation, an electric field is generated in the air surrounding the current-carrying conductors. This electric field allows corona to occur, and this corona can create an audible noise. Corona is the partial electrical breakdown of the insulating properties of the air in the vicinity of the conductors of a transmission line. When the intensity of the electric field at the conductor surface exceeds the breakdown strength of the surrounding air, a corona discharge occurs at the conductor surface. Energy and heat are dissipated in very small volumes near the surface of the conductors. Part of this energy is in the form of small local pressure changes that result in audible noise.

Corona-generated audible noise can be characterized as a hissing, cracking sound which, under certain conditions, is accompanied by a 120-Hertz (Hz) hum. Corona-generated audible noise is of concern primarily for electrical lines and equipment that are operated at 230 kV and higher during inclement weather conditions. The conductors of high voltage transmission lines are designed to be corona-free under ideal conditions. However, slight variations and irregularities in the conductor surface can cause distorted electric fields near the conductor surface, and the occurrence of corona. The most common source of distorted electric fields at the conductor surface is water droplets on, or dripping from, the conductors. Therefore, audible noise from high-voltage transmission lines and substations is generally associated with, and enhanced by, wet weather (i.e., wet conductor) phenomenon, which can occur during periods of rain, fog, snow or icing. These conditions are expected to occur infrequently and will usually be limited to a “hissing” sound that will be 40 dB or less (40 dB is comparable to a quiet library). During fair weather, insects and other contaminants on current carrying conductors can also serve as sources of corona. Corona current carrying conductors can also generate electromagnetic interference for radio and television receivers. Corona generated interference is localized and rarely noticeable outside the transmission line rights-of-way or beyond the immediate vicinity of substations.

Another type of radio and television interference, known as gap-type noise, is caused by an oxidized film between two connected metallic, current-carrying electric hardware pieces. The film acts as an insulator between the surfaces and causes small electric sparks, which produce noise and interference. Gap type interference normally causes radio or television interference within a mile or less of the source. When such an interference condition occurs, corrective actions can be taken to eliminate the source.

SCE&G’s construction and maintenance practices will ensure proper connections of current carrying equipment throughout the operational life of the Graniteville-South Augusta / Urquhart-

Graniteville #2 Lines; therefore, no adverse audible noise or radio and television interference effects are expected to be associated with the Lines' operation.

5.14 Safety

To provide for public safety and protection, SCE&G will design and construct the Graniteville-South Augusta / Urquhart-Graniteville #2 Lines in a manner that will comply with, or exceed, the latest standards of the National Electrical Safety Code in effect at the time of design. SCE&G commits to continue their long-standing tradition of operating and maintaining their facilities in a manner that will ensure public safety over the life of the facilities.

5.15 Electric and Magnetic Fields

Electric and magnetic fields ("EMF") exist anywhere there is electricity, whether that electricity is being produced, distributed, or consumed. Thus EMF is created by power lines, residential wiring, appliances, and even by the earth itself. Since the early 1970s, hundreds of studies have debated the possible health effects of EMF. In 1996, the National Academy of Sciences ("NAS"), National Research Council, completed its review of the literature on the possible health risks of residential exposure to power-frequency electric and magnetic fields. In 1999, the National Institute of Environmental Health Sciences ("NIEHS") completed a comprehensive program of research and analysis to clarify the potential health risks from exposure to extremely low frequency electric and magnetic fields.

The NAS report stated, *"Based on a comprehensive evaluation of published studies relating to the effects of power frequency electric and magnetic fields on cells, tissues, and organisms (including humans), the conclusion of the committee is that the current body of evidence does not show that exposure to these fields presents a human-health hazard." The NAS went on to say, "No conclusive and consistent evidence shows that exposures to residential electric and magnetic fields produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects."*

NIEHS concluded that the evidence for a risk of cancer and other human disease from the electric and magnetic fields around power lines is "weak." The NIEHS stated that "the results of the EMF-RAPID program do not support the contention that the use of electricity poses a major unrecognized public-health danger." NIEHS Director Kenneth Olden, Ph.D., said, *"The lack of consistent, positive findings in animal or mechanistic studies weakens the belief that this association is actually due to EMF, but it cannot completely discount the epidemiological findings. For that reason, and because virtually everyone in the United States is routinely exposed to EMF, efforts to encourage reductions in exposure should continue."*

EMF levels drop sharply with increased distance from a power source. SCE&G has published information listing the typical 60 Hertz magnetic field levels associated with 115 kV lines. Directly under the line, the range is 2.1-19.3 milliGauss (mG); at the edge of the right-of-way, the range is 0.6-3.4 mG; 50' from the edge of the right-of-way, the range is 0.3-1.9 mG. This data is the same as published by Duke Energy Corporation with respect to 100 kV lines. Moreover, Duke Energy publishes information shown in Chart 5.15-1 regarding 230 kV lines (SCE&G has not published similar data for 230 kV lines).

Chart 5.15-1 Magnetic Field Levels Associated with 230 kV Lines

Location	Typical EMF Level Range
Under the Line	4.5-29.0 mG
Edge of Right-Of-Way	1.9-6.4 mG
50' From Edge of Right-Of-Way	1.0-3.5 mG

Generally, the normal background magnetic field strength levels away from electrical devices are 0.6-1.5 mG. In homes, typical daily magnetic field strength levels around common electrical devices and appliances are higher. Chart 5.15-2 shows typical magnetic field strength ranges for certain appliances as published by SCE&G and Duke Energy.

Chart 5.15-2 Magnetic Field Levels Associated with Common Appliances

Appliance	Distance from the EMF Source		
	1 Inch	1 Foot	3 Feet
Microwave oven	140.0 mG	65.0 mG	10.0 mG
Refrigerator	6.0 mG	4.0 mG	1.2 mG
Electric Range	250.0 mG	25.0 mG	2.0 mG
Electric Razor	500.0 mG		
Hair Dryer	100.0 mG	30.0 mG	
Electric can opener	5,000.0 mG		
Computer terminal / TV	26.0 mG	3.4 mG	1.2 mG
Electric Clock	130.0 mG	15.5 mG	2.5 mG

5.16 Ozone

High-voltage transmission facilities may, under some conditions, produce small amounts of ozone as a consequence of corona discharge. This discharge is caused by abrasions on conductors or foreign-particle contamination of the insulators or hardware. SCE&G takes care to eliminate or minimize corona discharge from random arcing through careful design of the connections, fittings, hardware, and insulation.

Organizations such as the Illinois Institute of Technology have conducted extensive field tests under various weather conditions to detect ozone around high-voltage substations and 765 kV lines. These tests showed no significant adverse effects on plants, animals, or humans from levels of ozone that may be produced in operating transmission facilities at voltages up to 765 kV.

The Graniteville-South Augusta 230 kV Tie Line / Urquhart-Graniteville #2 230 kV Line should not produce any detectable amount of ozone under any operating condition, and thus will have no adverse effect on environmental quality.

FIGURES

APPENDIX A

REFERENCES AND DATA SOURCES

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APPENDIX B

BIOLOGICAL ASSESSMENT REPORTS

APPENDIX C

CULTURAL RESOURCES INVESTIGATION REPORTS
(Architecture / District Architecture and Archaeology)

APPENDIX D

HISTORIC STRUCTURES VISUAL IMPACT ASSESSMENT REPORT